COMPLICITY IN GAMES OF CHASE AND COMPLEXITY THINKING: EMERGENCE IN CURRICULUM AND PRACTICE-BASED RESEARCH

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Abstract

This thesis explores how the discourse of complexity thinking can be used to foster emergence in curriculum and practice-based research. The curriculum-related exploration focused specifically on games of chase as one facet of early childhood curriculum. It investigated using complexity thinking firstly, to occasion emergence (that is, create a new phenomenon) in children's games of chase at an early childhood centre and secondly, to describe this emergence. The research-related exploration focused on creating an emergent methodology which is underpinned by complexity thinking.

In this thesis report, I present a series of emergent curriculum-related phenomena that arose during the explorations, that is, an emergent game, a local curriculum theory for games of chase, the concepts of local curriculum theory, curriculum design and curriculum dynamics, and a curriculum vision. I also present an understanding of emergent methodology and two methodological innovations in the form of the Research Data Management System and the Visual Summary.

This research involved taking the role of a volunteer teacher-researcher-curriculum designer at an early childhood centre to play games of chase with children. This role was informed by and contributed to a curriculum design that focused on designing the teaching and learning environment to occasion emergence in learning and curriculum.

The games of chase curriculum contributed to children's learning, my own learning and the general rhythm of life at the centre. The children learnt to distinguish between children who were playing and those who were not. They also learnt different ways to tag people in a game. In addition, the children and I developed a game playing routine before playing each game. This routine involved putting on tag belts, discussing what game we were playing and how we were going to play it. We played three different games of chase, starting with *tag*, followed by *What is the time Mr(s) Wolf?*, and finally the emergent game *Big A, Little A*.

The stories of emergence are described in visual, descriptive and narrative texts organised into curriculum stories, teaching stories and children's learning stories. Curriculum stories describe the activities that unfolded. Teaching stories present stories of teaching while learning stories are stories of children's learning. These stories represent views of the enacted curriculum as activity, teaching and learning respectively. Taken together, the stories present a description of the curriculum dynamics that unfolded at the centre in relation to games of chase.

This thesis shows that a local curriculum theory for games of chase at the centre emerged from the complex interactions of curriculum design and curriculum dynamics that unfolded at the centre. It also articulates the emergent concepts of local curriculum theory, curriculum design and curriculum dynamics using the language of complexity.

This thesis also presents the local curriculum theory as a curriculum vision. This vision involves a shift in thinking about curriculum as either a set "course to be run" or the "path created in the running" (currere) to embracing curriculum as both "the space for running" and currere. It is a vision that values both children's and teachers' interests, focuses on teachers and children exploring depth and breadth of a curriculum domain together, enables teachers to follow, generate and sustain children's interest in the explorations, and is generative, flexible and future-focused.

This thesis conceptualises an emergent methodology as a methodology for emergence which (1) involves the researcher actively striving to foster emergence in research, (2) is brought forth in the interactions between the designed and enacted facets of methodology, (3) is local to a particular research project, and (4) emerges from the interactions of several related strategies.

This thesis can be seen as an attempt to change the language game of curriculum by using the language of complexity throughout the thesis. In so doing, it not only enables the reader to talk about the discourse of complexity thinking, it also enables the reader to experience the discourse and the emergence of the curriculum-related phenomena and the methodological innovations that are the focus of this thesis.

Finally, this thesis argues that using the discourse of complexity thinking in teaching and research can be enabling. It can enable the teacher and/or researcher to be creative, flexible and ethical within the constraints of his/her professional and personal life.

Acknowledgements

Bismillahirahmanirahim

In the name of Allah Most Gracious, Most Merciful

Dedication

Dedication

I dedicate this thesis to the people of Christchurch for their resilience in the face of adversity. Kia kaha, be strong and stay strong Christchurch. I also dedicate this thesis to those people, near and far, who have helped in any way – big or small, tangible or intangible, direct or indirect.

The story behind the dedication

This thesis has survived two major earthquakes in Christchurch. The first was a 7.1 magnitude earthquake that took place at 4.35 am on 4th September 2010. The second was a more devastating 6.3 magnitude earthquake that occurred at 12.51 pm on 22nd February 2011, when many residents were out and about in the city.

I was having my lunch in my fifth floor office when the second quake struck. My first thought was that it was just another of the thousands of aftershocks that we had had since the September earthquake. But when my desktop and laptop began bouncing as if they were on a trampoline, I realised that this was no ordinary aftershock. I scrambled to the doorway next to my desk and reached out to my laptop to prevent it from making a fatal leap off the table; it was a move to save the final draft of my thesis on that laptop. When the shaking finally stopped, the alarm went off and I heard an automated voice calmly urging me to evacuate the building. I needed no urging. I grabbed my laptop and, together with five other PhD students, made my way down the stairs. I crossed a big gap in the floor of the lift lobby and noticed water gushing like torrents into the fourth and third floor lift lobbies. The office building has since been declared unsafe and inaccessible. I count myself incredibly fortunate to have taken my laptop with me.

My family, too, survived the earthquakes. No lives were lost in the first earthquake but the death toll for the second one currently stands at 166. Many people were killed when buildings collapsed in the city's Central Business District (CBD). My son, Deen, was at school in the heart of the CBD at the time, and again, I count myself incredibly fortunate that he was unhurt.

My home, in the twice badly-hit suburb of Dallington, survived the first seismic event but not the second. My family of three took refuge at my mother-in-law's home which was also in

another badly-hit suburb. There we were without electricity and running water for 12 days; as I write, we are still without sewerage and have been informed that the sewerage system has been so badly damaged that it may be months before we have sewerage again. In the meantime, my husband, David, made our own toilet with an old plastic chair, a bucket, some tarpaulin and a hole in the garden. During the twelve days without electricity and water, on the advice of a neighbour, we bought some solar garden lights which we charged in the daytime and used them to light the house at night. Friends offered us drinking water and let us charge our cellphones, take showers, do our laundry and use the Internet. I felt as if we were urban campers who "went to town" once every few days to replenish our supplies.

In the midst of the chaos and uncertainty, I saw numerous examples of humanity at its best. Neighbours and strangers shared information for coping with the challenging conditions. Strangers offered us the use of their home telephone before ours was re-connected. Neighbours, strangers and friends lent a hand to dig out the silt that erupted in the earthquake and blanketed properties and roads, as well as to secure houses and make them weatherproof. Family, friends and strangers from near and far offered food and water. At collective levels, neighbourhoods and communities banded together to distribute food and water. The Student Volunteer Army emerged as 12000-plus volunteers signed up to help clear silt from properties. Church groups formed working bees to do the same. The University of Canterbury formed a 'hub' for staff and students to access the Internet, socialize and support each other. Local radio stations became an exchange for sharing information as well as for offering and asking for help. One company took the initiative to bring in a 16-cubicle mobile shower for use by residents in suburbs without running water. The national and local governments galvanized volunteers to check on both the welfare of residents and the structural integrity of their dwellings. New Zealand and Australian police patrolled the suburbs to prevent burglaries and looting from vacant properties.

As I reflect on the events following the big shake on 22nd February, I see the above examples of humanity at its best also as examples of complex adaptive systems at individual and collective levels. These complex adaptive systems arose from and/or responded to a perturbation that took the form of the devastating earthquake, generating creative solutions grounded in humanitarian values.

7th March 2011

Notes

1. This thesis report embeds and embodies complexity thinking, and has a non-traditional, non-linear and complex structure. I have created a number of tools for navigating this complex structure. These tools are explained in Section 1.5 and its sub-sections (pp. 6-11) and include coloured pages and a system for referencing different parts of the thesis report.
2. This thesis report also includes a DVD which is attached to the back cover of the report. This DVD contains the Visual Summary and its associated files. Please refer to Appendix D for technical specifications and issues related to the Visual Summary DVD.

Table of Contents

Key to colour codes in General Table of Contents

Thread 1: Research methodology and design
Thread 2: Curriculum design: Occasioning emergence in games of chase
Thread 3: Curriculum dynamics: Describing emergence in games of chase
Thread 4: Curriculum theory

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Chapter 1
Introduction

Chapter 1 is an element of Thread 1: Research methodology and design

Summary: In this chapter, I

- introduce the purpose and context of the thesis,
- identify the contributions to knowledge,
- present an overview of the research methodology,
- explain the non-linear structure of the thesis report and the tools to navigate the report.

1.1. Purpose

This thesis explored how the discourse of complexity thinking can be used to foster emergence in curriculum and practice-based research. The curriculum-related exploration focused specifically on games of chase as one facet of early childhood curriculum. It investigated using complexity thinking firstly, to occasion emergence (that is, create a new phenomenon) in children's games of chase at an early childhood centre and secondly, to describe this emergence. The research-related exploration focused on creating an emergent methodology which is underpinned by complexity thinking.

In this thesis report, I present a series of emergent curriculum-related phenomena that unfolded in the thesis exploration: (1) a new game, (2) a local curriculum theory for games of chase at the Centre, (3) the concepts of local curriculum theory, curriculum design and curriculum dynamics, and (4) a curriculum vision. I also conceptualise an understanding of emergent methodology from the perspective of complexity thinking and present two methodological innovations, the Visual Summary and the Research Data Management System. I argue that using the discourse of complexity thinking in teaching and research can be enabling. It can enable the teacher and/or researcher to be creative, flexible and ethical within the constraints of his/her professional and personal life.

1.2. Background

The idea to blend complexity thinking and games of chase in this research emerged from a confluence of experiential influences and contextual factors. The experiential influences included the events, experiences and interests related to my professional history as both an early childhood and a physical education teacher. The first influence was the focus of my master's degree qualification on complexity theory/science/thinking, physical education and early childhood education (Hussain, 2007), and my emerging interest to contribute to the development of a disciplinary knowledge base for early childhood physical education. The second was the games of chase that I played with children, and wrote about as children's learning stories (Carr, 2001) at the Centre where I taught just prior to starting my PhD study. These games of chase experiences gave rise to my interest in exploring these games as one facet of early childhood physical education from both early childhood and physical education perspectives.

The contextual factors that influenced my interest in this research relate to the current implementation of a 10-year strategic plan for early childhood education (ECE) in

Aotearoa/New Zealand (Ministry of Education, 2002). This plan focuses on achieving the goals of (1) increasing participation in quality ECE services, (2) improving the quality of services that provide ECE, and (3) promoting collaborative relationships among groups and organisations involved in ECE.

Between 2002 and 2007, the implementation of this strategic plan had given rise to (1) a 6.1% increase in the number of children participating in some form of early childhood education (Ministry of Education, 2007b), (2) an on-going and concerted effort by the early childhood sector and the New Zealand government to raise the professionalism of early childhood teachers to the same standards as school teachers (Ministry of Education, 2002) as a means of ensuring quality in early childhood education, and (3) links between the notion of quality in early childhood education and the government's frameworks for funding, regulating and chartering early childhood services (Ministry of Education, 2002; 2007a). This push for increasing participation and quality in early childhood education has the potential to positively affect the lives of young children. At the same time, the use of funding and regulatory frameworks as mechanisms for ensuring quality also implies an increasing institutionalisation of early childhood in New Zealand.

Although there is a growing literature and research base for the field of early childhood education, a search for early childhood literature and research associated with games of chase at early childhood centres and early childhood physical education revealed (1) a lack of research associated with both games of chase and early childhood physical education and (2) literature highlighting issues of safety and aggression associated with games of chase. This revelation suggests a need for more research in these areas. Such research, in the context of an increasing institutionalisation of early childhood, can enhance the enactment of the early childhood curriculum and children's learning and development in, through and about movement.

By framing this research within the above context of early childhood education, and at the same time, exploring it from within and across multiple disciplines such as physical education, curriculum and complexity thinking, it is my hope that this research can contribute to (1) knowledge of early childhood curriculum, (2) the development of a disciplinary knowledge base for early childhood physical education and (3) knowledge of complexity thinking in education.

1.3. Complexity thinking

Complexity thinking is a discourse or a way of thinking and acting that is based on the assumption that we live in a complex world (Davis & Sumara, 2006) where inter-connections abound and they affect us in visible and invisible ways. Davis and Sumara assert that complexity thinking is not an explanatory system, but "an umbrella notion that draws on and elaborates the irrepressible human tendency to notice similarities among seemingly disparate phenomena" (p. 7).

The discourse of complexity thinking has emerged from and within studies of complexity. It is beyond the scope of this thesis to explore the history of this field; suffice to say that it is a multi-disciplinary, inter-disciplinary and trans-disciplinary field which is characterised by diversity. Studies of complexity both contribute to and draw upon other fields of knowledge (see Davis & Sumara, 2006; Alhadeff-Jones, 2008) and some of the language associated with complexity have included chaos, chaos theory, complexity theory, self-organisation, emergence, complex adaptive systems, living systems, learning systems, complexity science and complexity thinking. Researchers who work within the field of complexity are sometimes referred to as complexivists (Davis & Sumara, 2006).

Given the diversity in the field of complexity, this thesis deals with a type of complexity referred to as complicity. This term was coined by Cohen and Stewart (1994) to refer to a class of phenomena where "totally different rules converge to produce similar features, and so exhibit the same large-scale structural patterns" (p. 414). Complicity is associated with highly complex systems that continually interact and influence each other directly and indirectly and implicates the observer as part of the interactions. It carries the connotation of entanglement and systems that are complicit co-emerge with each other, that is, they change together but not necessarily at the same pace. Thus, systems whose relationships are characterised by complicity are simultaneously distinct and inseparable from each other.

Davis and Sumara (2006) present complexity thinking as an important and suitable attitude for teachers and educational researchers since both are concerned with exploring what is currently possible to expand the space of human possibility, but doing so in ways that are ethical. Complexity thinking foregrounds ethical responsibility and reflexivity because, as teachers and researchers, we are complicit, that is, entangled, in the possibilities that we occasion in our settings in the sense that these can continue to unfold well beyond the duration of our physical presence at the setting.

For the purposes of this thesis, I frame the notion of complexity thinking as a way of thinking and acting that has two important features. The first feature is a consciousness of couplings which exist in teaching and research, where couplings are connections between entities that involve the entities mutually influencing each other. Consciousness can be tacit and/or explicit while couplings can be visible and/or invisible as well as potential and/or actual. The second feature of complexity thinking is a focus on expanding possibilities in curriculum, teaching and learning in ways that are ethical and meaningful for individuals and collectives.

1.4. Methodology

This thesis adopts Clough and Nutbrown's (2002) notion of methodology as "the painstaking justification we offer for the decisions we have made" (p. 28). Methodology permeates the whole research and affects the "coherence and … power to persuade others of our research" (p. 28). They assert that research is methodology and in doing research, we should strive to demonstrate that "the whole research is methodological" (p. 32). The notion that research is methodology is consistent with complexity thinking in the sense that methodology and research are complicit with, or entangled in, each other. Furthermore, the image of a permeating presence of methodology in research is consistent with the image of an entangled relationship between methodology and research.

The thesis exploration used an emergent methodology. I discuss this notion in Chapter 13 [13.1], but propose an initial conceptualisation of emergent methodology as an approach in which the research design and analysis are both structured and flexible to enable creative decisions and justifications to emerge within the constraints of the structure. An overview of the structure is explained below in Section 1.5 and its sub-sections [1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5]. Flexibility in an emergent methodology can be described in terms of incorporating unfolding data and knowledge into the research process (Robson, 1993) and taking advantage of new opportunities during data collection and analysis (Patton, 2002). In addition, an emergent methodology, as used in this thesis, carries connotations of both unintended and occasioned emergence [3.1]. In an emergent methodology that is unintended, there is no intention to create a new phenomenon. In an emergent methodology that is occasioned, there is a deliberate intention to create a new phenomenon, which, in this thesis, involved an intention to create a new game and, to generate new knowledge in, through and about games of chase, curriculum and complexity thinking. However, despite this intention, the new game and knowledge were not pre-determined and only unfolded during the thesis exploration.

This thesis assumes that an emergent methodology is 'messy'. Given this 'messiness', the decisions made as part of the thesis were based on a diversity of grounds: (1) epistemological, ontological and theoretical (Cresswell & Miller, 1997; Crotty, 1998; Bogdan & Biklen, 1998), (2) purpose and value (Donmoyer, 2001), and (3) context (Greene, 2001). The epistemological, ontological and theoretical justifications tend to permeate the entire thesis report and are explained in this chapter and in Chapters 2 and 3. Those justifications that are based on purpose, value and contextual considerations tend to be localised to certain facets of the thesis exploration, for example, those related to the purpose, value or context of playing games of chase. Localised justifications are therefore relevant to one or more sections of the thesis report and can be found in all chapters.

1.5. Thesis exploration and report

The 'messiness' associated with an emergent methodology begs the question of how to present a thesis report that is simultaneously coherent and embodies and embeds this messiness. I do this by distinguishing between two coupled facets of a thesis, that is, the thesis exploration which represents the process of new knowledge creation and the thesis report which represents one of several outcomes or products of this knowledge creation process. Thus, the thesis exploration is on-going while the report is a particular view or state of this exploration at a particular point in time. This simultaneously distinct but responsive relationship between thesis exploration and report is consistent with Davis' (2008) distinction between the actual act of producing a research report and the written product; the latter is "a particular sort of participation" (p. 59) that is partial and a part of the act of producing knowledge, which is an ever-evolving reality.

1.5.1. Organising structures

This thesis uses different organising structures for organising the thesis exploration and report. I refer to the organising structures as "phases" and "curriculum concepts" respectively. Figure 6.1 shows other conceptual tools used in association with these organising structures.

The thesis exploration is temporally organised into three different phases corresponding to different timeframes: the preparing phase (April 2008 to January 2009), the teaching phase (January to April 2009) and the knowledge creating phase (April 2009 to March 2011). This organising structure draws attention to the different purposes of data analysis and the inter-twining roles I played during the thesis exploration, that is, as teacher, researcher and

curriculum designer. These are explained in Chapter 6. It also draws attention to the fact that the thesis exploration is a historical process, thereby enabling the history of the thesis exploration to be iteratively and recursively recorded and reflected upon at any point in time.

The thesis report is conceptually organised in terms of the concepts of local curriculum theory, curriculum design and curriculum dynamics. These are concepts that emerged in the thesis exploration as tools to make sense of the thesis exploration. Thus, using them as conceptual organising structures provides clarity and coherence to the thesis report and consistency with the overall research purposes of occasioning and describing emergence. The concepts are briefly explained below [1.5.3] and discussed in Chapter 12.

1.5.2. Thesis report strategies

There are three main strategies used in this thesis report to achieve a methodological thesis [1.4] in ways that are consistent with the two features of complexity thinking above [1.3].

The first strategy is to show both 'messiness' and coherence in the exploration by presenting different views of the exploration and showing complicity within and across the different views. In relation to the main curriculum-related focus, this means making visible the complicity or entangled relationships among different parts of the thesis which is achieved by presenting six different views of curriculum, that is, curriculum as structure, process, content, teaching, activity and learning, and making visible one or more of the other views when presenting a particular view. In relation to the methodology-related focus, this means making the methodological innovations, that is, the Research Data Management System and the Visual Summary, sufficiently visible and clear without rendering the main curriculum focus invisible or incoherent. Such a strategy is consistent with the enfolding and unfolding nature of knowledge as a complex phenomenon, explained in Chapter 2 [Coupled knowledge 2.1], in the sense that any one of the views above enfolds in and unfolds from other views.

The second strategy is to use the language and concepts of complexity thinking throughout the thesis. The strategy is based on the assumption that the language and concepts of complexity thinking is unfamiliar language within teaching, curriculum, early childhood education and/or physical education. By using as much of the language and concepts as is appropriate in the thesis, their meanings become clarified in use and there is a visible and permeating presence of the language in the report.

The third strategy is to use multiple and mixed voices, styles and perspectives to understand and depict the research as authentically as possible "in all its complexity while being self-

analytical, politically aware, and reflexive in consciousness" (Patton, 2002, p. 41). This strategy is embodied in three different (re)presentation voices, that is, explanatory, narrative and reflective voices. The strategy's relationship to the data analysis, interpretation and (re)presentation strategy is explained in Chapter 6.

1.5.3. Thesis report structure

The thesis report is organised into four threads, three of which are directly related to curriculum and the fourth to research methodology and design. The curriculum-related threads count as the substantive or main focus of this thesis while the methodology-related thread as the supporting thread. This organisation is visible in the table of contents in the form of the colour codes and represented as a diagram in Figure 1.1

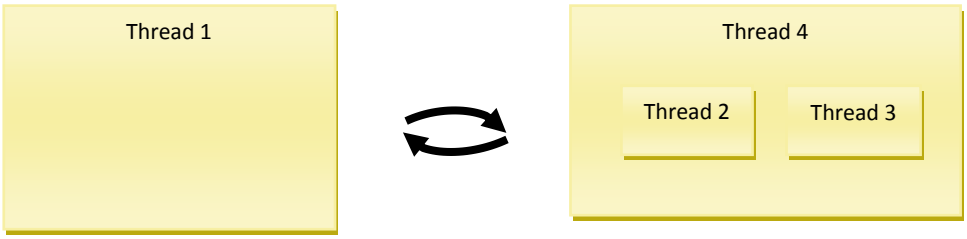


Figure 1.1: Relationship among the four threads

Figure 1.2 below elaborates on Thread 1 and identifies the elements in this thread that address the methodological and design considerations and issues in the thesis. It elaborates on the structure of the thesis report as it relates to research methodology and design.

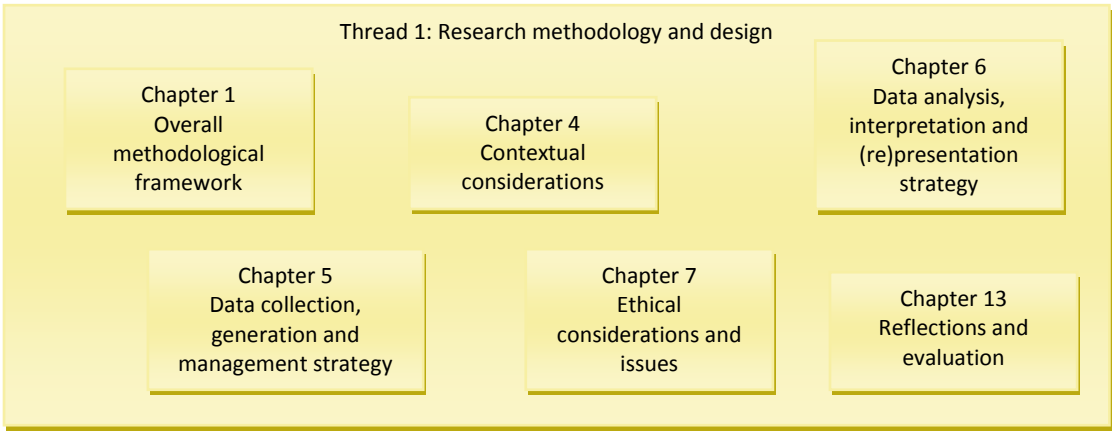


Figure 1.2: Elements in Thread 1

The two methodological innovations in this thesis, the Research Data Management System and the Visual Summary, are considered as parts of Thread 1. The Research Data Management System is presented in Chapter 5. The Visual Summary is found on the DVD at the back of the thesis report, and the story, explanation, discussion, reflection and

specifications related to the Visual Summary are distributed across different chapters, that is, in Chapter 6 [6.7], Chapter 10 [10.2], Chapter 12 [12.2], Chapter 13 [13.2] and Appendix D respectively.

Figure 1.3 below elaborates on the structure of the thesis report as it relates to curriculum. There are six inter-related elements in curriculum. There are three threads in the thesis report associated with six views of curriculum, all of which are presented in the languages of teaching and complexity. Three of the views are associated with curriculum design and the other three with curriculum dynamics.

The concept of curriculum design relates to the purpose of occasioning emergence in games of chase while the concept of curriculum dynamics relates to the purpose of describing the emergence. Both of these, in turn, constitute a local curriculum theory.

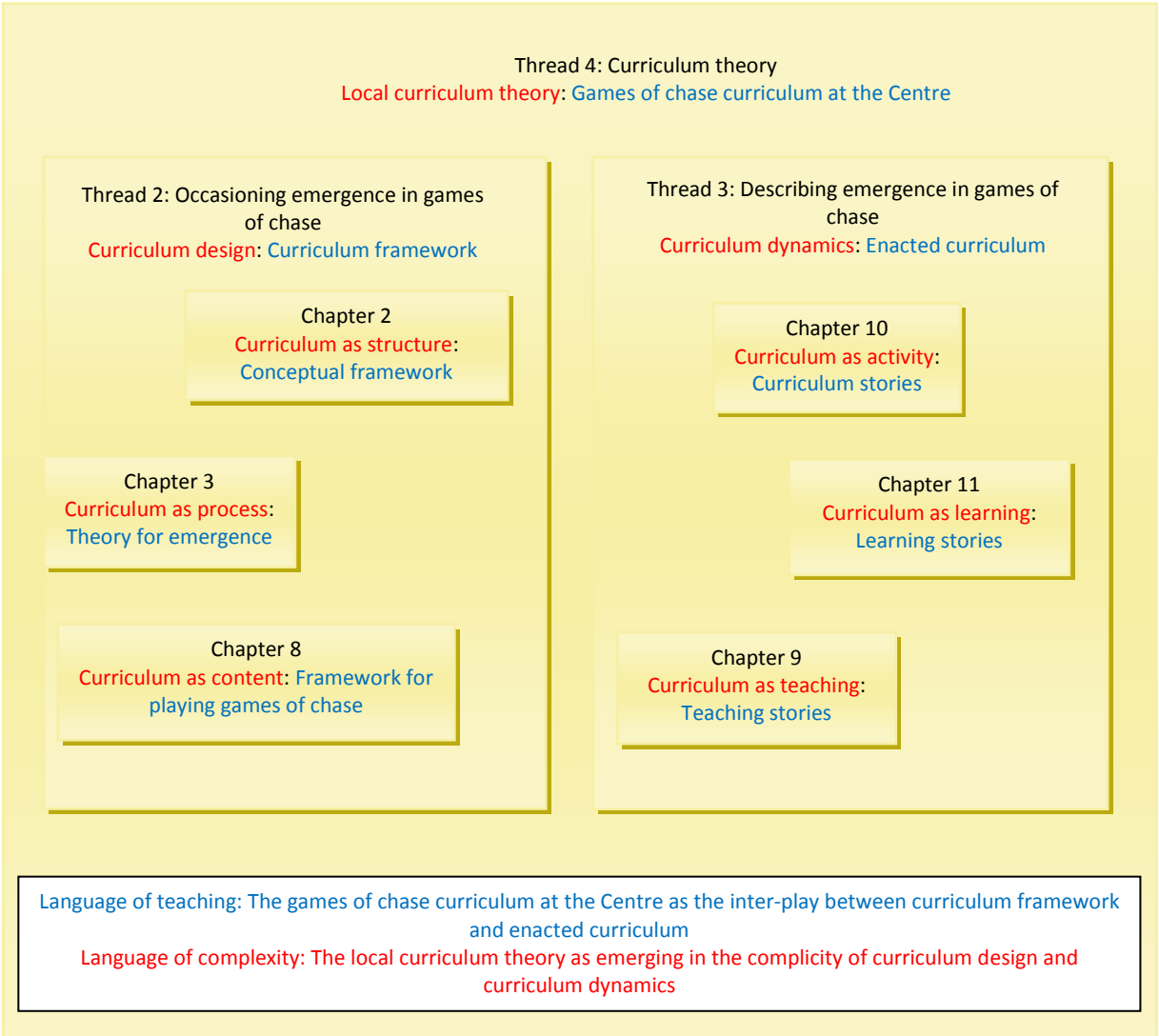


Figure 1.3: Structure of thesis report directly related to curriculum, expressed in languages of teaching and complexity

In this thesis, the purposes, chapters and threads are not considered separate. Instead they are coupled, that is, they are inter-connected and mutually influence each other. The concept of coupling is explained in Chapter 2.

1.5.4. Recursion in the thesis report structure

I present the curriculum-related focus in this report in a way that embodies the process of recursion. In recursion, a particular step in a process is called upon repeatedly in a nested way so that the answer to the first or original call only emerges at the end of the process. Fleener (2002a) explains the nature of recursion in a recursive programme:

> "Each time a program recurses, it doesn't just go back to the beginning; it creates a new world where the initial conditions are different from the previous world and where some evaluation occurs or a decision is made. As the recursive process continues, new worlds are created each time (in the middle of one world) new possibilities are created. … Once we are finished with one world, … we leave that (world) to return not to the original (world) but to return to the world that sent us to the one we just completed." (p. 169)

I describe the recursion in the thesis report structure in terms of the following process:

> Explaining the local curriculum theory means explaining curriculum design and curriculum dynamics.
>
> > Explaining curriculum design means explaining curriculum as structure, curriculum as process and curriculum as content.
> >
> > Explaining curriculum dynamics means explaining curriculum as teaching, curriculum as activity and curriculum as learning.

Thus, to read this thesis is to experience recursion because although the concept of local curriculum theory is the first concept to be introduced in Chapter 1, its meaning becomes clear only after I have explained all the other related concepts in a nested way.

1.5.5. Tools for getting around the thesis report

In addition to the organising structures, thesis report strategies and structure, there are other tools used in this report. The tools are intended as means to make visible the features of complexity thinking as well as to avoid confusion and incoherence that can unfold in striving to do so. Some of the tools, such as numbered sections, figures and tables, are standard tools within a thesis. Others, such as coloured pages, coupled knowledge and story, have been created for this report. There is also a tool for referencing different parts of the thesis. These tools are explained in Table 1.1.

I have considered creating a glossary of complexity-related terms for this thesis but have decided against this for two reasons. Firstly, I believe that the meanings are better explained in the context of a discussion or an example, instead of a definition. Secondly, the tool for referencing different parts of the thesis report enables the reader to find the relevant sections that include the meanings-in-context.

Table 1.1: Summarising the tools, their purpose and how they are labelled in the report

Tool	Purpose	How tool is labelled in the thesis report
Coloured page	Indicates the beginning of a new chapter and the thread to which the chapter belongs. Contains chapter summary.	Refer to General Tables of Contents for colours associated with the different threads.
Numbered section	Organises writing into bodies of text which are coherent wholes, part of a bigger whole and related to other wholes in a way that enables easy referencing between sections.	• 1.5. refers to Section 1.5. in Chapter 1, that is, fifth section in Chapter 1. • 1.5.1. refers to Section 1.5.1. in Chapter 1, that is, first sub-section of the fifth section in Chapter 1.
Figure	Presents a summary of a text in a visual form.	Figure 1.1 refers to the first figure in Chapter 1.
Table	Shows relationships among ideas and text in a summarised form.	Table 1.1 refers to the first table in Chapter 1. Table A1 refers to the first table in Appendix 1.
Coupled knowledge	Presents an idea, literature or data that is related but peripheral to a particular description or discussion.	Coupled knowledge 2.1 refers to the first coupled knowledge box in Chapter 2.
Story	Presents evidence from the data to support an assertion or idea in a text.	Story 3.2 refers to the second story in Chapter 3.
Referencing different parts of thesis report	Shows links between different parts of thesis and makes visible the complicity between parts of the thesis.	• [2.1] means that there is a link between current text and that in the section in Chapter 2 labelled 2.1. • [VS: tag5] means that there is a link between current text and the episode labelled tag5 in the Visual Summary on the DVD. • [Table 10.1] means that there is a link between current text and the first table of Chapter 10. • [Chapter 3] means that there is a link between current text and the chapter.

Chapter 2
Curriculum as structure: The conceptual framework

Chapter 2 is an element of Thread 2: Curriculum design. It presents a structural view of curriculum in the form of a conceptual framework.

Summary: In this chapter, I

- explain the concepts of complex systems and coupling,
- use the two concepts to describe the conceptual framework, that is, the system of knowers, knowledge and curriculum in early childhood education,
- identify how curriculum as process is visible in this view of curriculum as structure,
- discuss how the conceptual framework contributes to curriculum design.

2.1. Complex systems

This thesis explores the complex systems of curriculum, knowers and knowledge, all of which exist in complicity with each other [1.3, 3.3]. These systems have a range of characteristics including the following: (1) they have a nested structure [2.3], that is, are self-similar, (2) they are structure determined [2.2.], (3) they can undergo self-organisation to give rise to emergence under certain conditions (Davis & Sumara, 2006) [Chapter 3].

Complex systems have also been referred to as living systems, complex adaptive systems and learning systems. Capra (2003) and Maturana and Varela (1998) use the term living system and characterise it as a system that is alive or one that lives. Johnson (2001) uses the term complex adaptive system to highlight the capacity of such a system to simultaneously adapt to its environment and adapt its environment for its own purposes. Davis and Simmt (2003) and Davis and Sumara (2006) refer to this type of system as a learning system or a system that learns. The features of aliveness, adaptive capacity and learning capability are all present in the systems referred to in this thesis; thus, I use the terms complex systems, living systems and learning systems inter-changeably when referring to the systems I am exploring.

A complex system is different from a complicated system such as a car although both are systems with many interacting parts. Unlike complicated systems, the nature of the interactions among the parts in complex systems is neither fixed nor clearly defined (Davis & Sumara, 2006) and therefore more fluid. As the system and/or its parts change, so too does the nature of the interactions. At the same time, the system cannot exist without the relationships among the parts. Thus, a complex system exists in a complicit relationship with its parts. Furthermore, these parts have a similar form to the system it is a part of and can also be referred to as agents, entities, unities or sub-systems that make up the system (Davis & Sumara, 2006; Davis, Sumara, & Luce-Kapler, 2000; Johnson, 2001; Keirsey, 1999). In this thesis, knowers, knowledge and curriculum fit the characteristics of complex systems [2.3] while the system of tools for getting around in this thesis report [1.5.5] counts as a complicated system because the tools and their inter-relationships do not change.

2.2. Loose and structural couplings

This thesis uses the concepts of structural coupling and loose coupling to describe the nature of interactions and relationships that are present in the systems of knowers, knowledge and curriculum. The meanings of loose coupling and structural coupling connote some similarities and differences. However, the two concepts are not mutually exclusive concepts.

Structural coupling and loose coupling both carry the connotation of connections between unities in ways that involve the unities mutually influencing each other. Both also stress the importance of each unity conserving its independent identity while being responsive to the other(s) (Weick, 1976; Maturana & Varela, 1998).

The concept of structural coupling was used by biologists Maturana and Varela (1998) in relation to structurally-determined systems, that is, systems whose structures determine the systems' responses to external triggers. It has since been used in other fields including knowledge management (Koskinen, 2009) and art (Nees, 2000). The concept of loose coupling, on the other hand, has been widely used in studies of organisations since Weick (1976) and is also used in education (for example, Young, 2006; Meyer, 2002; Shulman, 2004). While structural coupling defines a process (Maturana & Varela, 1998), loose coupling is referred to as a concept that can help researchers study processes (Orton & Weick, 1990). Both make references to a system's history but in different ways.

2.2.1. Structural coupling

Structural coupling is a process that describes the nature of on-going and reciprocal relationship between a structure-determined system and its environment. Environment refers to the immediate environment in which the system lives (which, in this thesis, is assumed to be a system) as well as other systems it interacts with. The environment is seen as a source of disturbance or perturbation which triggers changes in the system. However, it is the disturbed system's structure that determines the nature of the change(s) that will take place. Maturana and Varela (1998) explain that changes "are brought about by the disturbing agent but determined by the structure of the disturbed system" (p. 96).

The process of structural coupling connotes a history of recursive and iterative interactions between systems. Maturana and Varela (1998) write,

> "We speak of structural coupling whenever there is a history of recurrent interactions leading to the structural congruence between two (or more) systems." (p. 75)

In this sense, a system's structure embodies its own history of interactions with other systems and the concept of structural coupling is related to the state of a system at a particular moment in time.

2.2.2. Loose coupling

The concept of loose coupling is used as a sensitising device to prompt the image of coupled entities that (1) are responsive to each other in ways that may be limited, infrequent, weak in

their mutual affect, unimportant and/or slow to respond, and (2) preserve their own identities and physical or logical separateness (Weick, 1976). Thus, loose coupling suggests the simultaneous presence of both responsiveness and distinctiveness (Orton & Weick, 1990). It "carries connotation of impermanence, dissolvability and tacitness" which are properties that make up the glue that holds a system together (Weick, 1976, p. 3). Furthermore, it is used with related concepts such as tight coupling and decoupling since the nature of coupling between entities can be dynamic; for example, over time, it can change from being loose to tight (that is, there is responsiveness without distinctiveness) to decoupled (that is, there is distinctiveness without responsiveness). Orton and Weick (1990) assert that to invoke the term loose coupling is to predicate certain properties and a specific history to the coupled entities.

Weick (1976) makes a distinction between the terms loose coupling and loosely coupled systems. The former refers to the relationship between two or more entities while the latter to the relationship among the elements that make up the system. In this thesis, I use both terms, for example, as in loose coupling of intention and action and in loosely-coupled systems of knowledge and activity respectively.

There are many ways in which loose coupling can occur between and within systems. Some of these ways which are relevant to this thesis include coupling among individuals, among hierarchical levels in a nested system, among ideas, between activities and between intentions and actions (Orton & Weick, 1990). Describing the ways loose coupling occur in a system can help to capture the structural elements that contribute to the system's distinctiveness and responsiveness at a particular point in time or over a period of time.

2.2.3. Using the terms in this thesis

I use structural coupling when referring to the process of interactions between systems whose structures are coupled and/or to the state of a system at a moment in time. Its use implies that there has been a history of interactions among the structure-determined systems resulting in changes to the systems. For example, I refer to the relationship between the local curriculum theory for games chase and the concept of local curriculum theory as structurally-coupled [12.3.1]; since the emergence of the latter from the former, both prompted on-going changes and revisions to each other.

I use the term loose coupling when referring to conceptual relationships among systems and/or their elements. The unities are simultaneously distinct from and responsive to each

other and the relationships among the unities meet the condition of simultaneous presence of neighbour interactions and decentralisation [3.4]. A description of how the loose coupling occurs implies a description of how the conditions manifest themselves in the relationships. For example, in explaining the framework for playing games of chase [8.1], I identify knowledge threads 1 and 2 as loosely-coupled threads or elements in the framework and describe the nature of their loose coupling. There is no reference to the coupling process or to the state of the knowledge threads at a particular point in time, only their conceptual relationship.

In cases where the nature of the coupling is ambiguous or unclear, or where it is not important to identify the nature of the coupling, I use the term coupling to refer to the relationship.

2.3. Nested systems in the conceptual framework

The conceptual framework consists of three coupled nested systems in ECE. The three systems are the nested systems of knowers, knowledge and curriculum which are summarised diagrammatically in Figure 2.1.

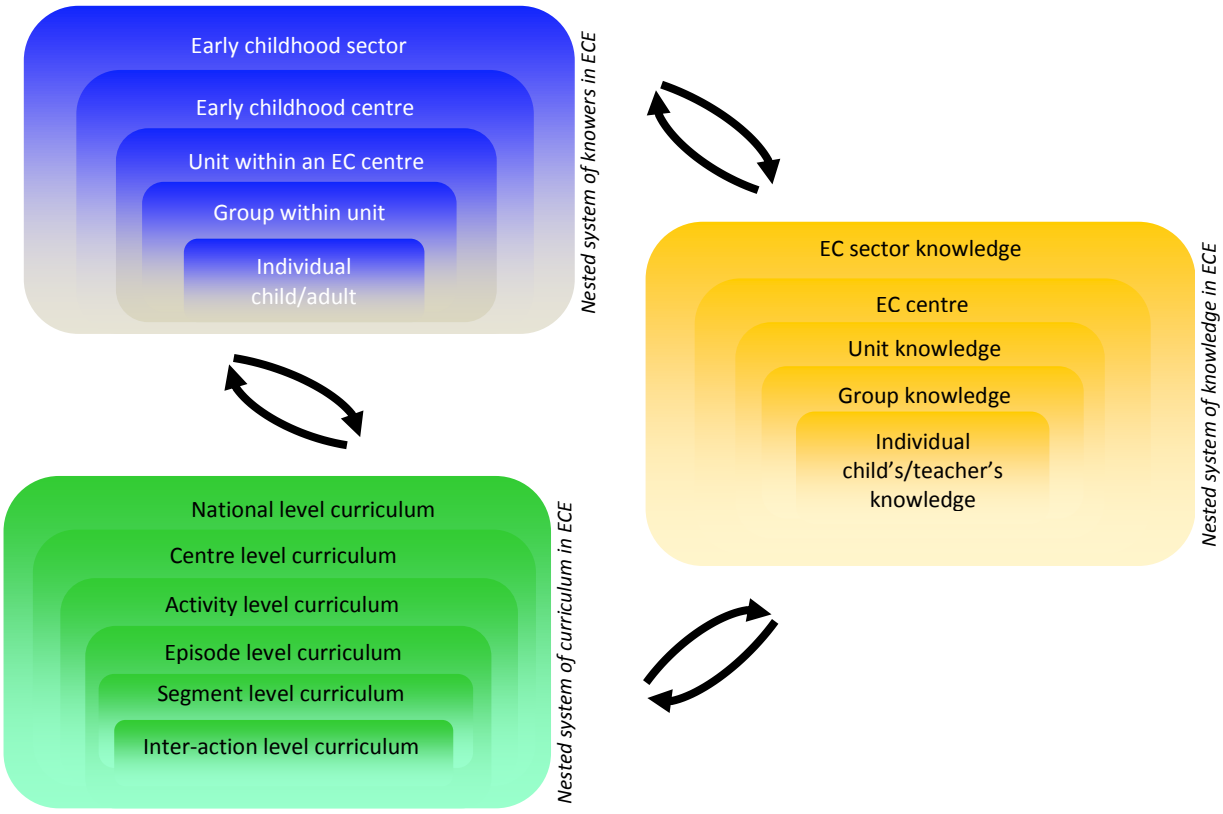


Figure 2.1: Nested and loosely-coupled systems of knowers, knowledge and curriculum in ECE

This conceptual framework draws upon the work of Davis and Simmt (2003) who identify similar systems of knowers and knowledge in a mathematics classroom. They describe children, mathematics, classroom communities and conversational interactions as learning systems. However, these represent different categories of learning systems, which are further elaborated on in Davis and Sumara (2006). Davis and Sumara categorise children and classroom communities as knowledge-producing systems, physical systems or knowers, with children as physical learning systems nested within the larger learning system known as the classroom community. On the other hand, mathematical ideas expressed during conversational interactions and mathematics represent systems of knowledge produced, which they also refer to as ideational systems or knowledge. Mathematical ideas generated during conversational interactions in a mathematics classroom count as an ideational learning system nested within a larger system known as mathematics.

Learning systems of knowers and knowledge also exist in ECE. Figure 2.1 identifies possible conceptualisations of the learning systems of knowers and knowledge in ECE, bearing in mind that other levels may exist between any two levels represented. The framework also acknowledges the complex nature of knowledge as described in Coupled knowledge 2.1

Within this framework, the meanings of group-as-knower and group knowledge depend on the context in and purpose for which these are used. For example, when used in the context of playing or describing a particular game episode, a group as knower refers to the group that is playing that episode of a game of chase and group knowledge refers to the knowledge that arises from the interactions of ideas and actions by individuals in the group during that episode. However, in describing what learning unfolded for children across the fourteen weeks, the group-as-knower refers to the children as a collective and group knowledge to the learning that is distributed across individual children [11.1].

Coupled knowledge 2.1: The complex nature of knowledge

This thesis recognises the complex nature of knowledge. Drawing from Davis and Sumara (2006), Maturana and Varela (1998), Wenger, McDermott, and Snyder (2002), Nonaka and Takeuchi (1995), Putnam and Borko (2000), and Begg (2008), some of the features of a complex view of knowledge include:

1. Knowledge is embedded in and embodies the act of knowing, that is, to know is to act and to act is to know (Wenger et al., 2002). Maturana and Varela (1998) assert that “all doing is knowing and all knowing is doing” (p. 25) and that “every act of knowing brings forth a world” (p. 25). Begg (2008) describes knowing as the processes of coming to know and knowledge as the product of knowing.

2. Knowledge exists at different levels, for example, as shown in Figure 2.1, and is simultaneously enfolding and unfolding in nature. This feature resonates with notions of individual and collective knowledge (Wenger et al., 2002) as well as knowledge at individual, group, organisational and inter-organisational levels (Nonaka & Takeuchi, 1995). At all levels, knowledge is enfolded in and unfold from knowledge at the levels above and below (Davis & Sumara, 2006).

3. Knowledge can be both tacit and explicit since we know more than we can tell and not everything we know can be made explicit (Wenger et al., 2002; Nonaka & Takeuchi, 1995). Begg (2008) refers to tacit knowledge as knowing without knowing.

4. Knowledge and knowing can exist as distributed knowledge and cognition. Knowing can be distributed or 'stretched over' individual and group knowers as well as physical and symbolic tools (Lave, 1988, as cited in Putnam & Borko, 2000).

5. Knowledge is always changing and moving at the same time that it consists of a stable core (Wenger et al., 2002). However, our judgments of the volatility or stability of knowledge is a question of the timescale at which the knowledge exists (Davis & Sumara, 2006) [2.4.2].

The third learning system, the system of curriculum, draws upon the national early childhood curriculum in Aotearoa/New Zealand, Te Whāriki (Ministry of Education, 1996), which describes curriculum as

> "the sum total of the experiences, activities, and events, whether direct or indirect, which occur within an environment designed to foster children's learning and development." (p. 10)

The meaning of curriculum in Te Whāriki (Ministry of Education, 1996) suggests that it is possible to view curriculum as a system of activities as opposed to a system of knowers or a system of knowledge. In this conceptualisation of curriculum as a learning system and a system of activities, I identify six different levels of the system that have emerged in this project: the national level curriculum, the centre level curriculum, the activity level curriculum, the episode level curriculum, the segment-level curriculum and the inter-action level curriculum [Figure 2.1].

The national level curriculum consists of the national early childhood curriculum, Te Whāriki (Ministry of Education, 1996), and the living curriculum, which arises from the interactions of all centres' curricula. The national level curriculum has properties that transcend any individual centre's curriculum.

A centre's curriculum, on the other hand, can be viewed as a unity at the centre level curriculum and reflects the centre's interpretation and enactment of Te Whāriki (Ministry of Education, 1996) weaved into its own unique blend of programme, philosophy, structure and environment. At the same time, the centre's curriculum emerges from the interactions of all

activities, events and experiences (referred to here as activities) that take place directly or indirectly within the centre's environment.

The activities that take place regularly within a centre constitute the activity level curriculum, and examples of these include toileting and sleep routines, mat times, teacher-facilitated activities, child-directed activities, teachers' roles, teachers' non-contact and the centre's enactment of its policies. To put it differently, an activity level curriculum is made up of a series of episodes of an activity that the centre community engages in, which are recognisable to the members of the community. Based on this conceptualisation, when games of chase are played regularly over a period of time, they can be viewed as activity level curriculum over that period of time.

Each episode of an activity can be viewed as curriculum at an episode level. For example, when teachers and/or children play games of chase three times on a particular day, each game counts as an episode of a game of chase.

A segment within an episode emerges from a sequence of inter-actions that (1) take place within a particular timeframe in an episode and (2) can be grouped together into a coherent whole. Examples of segments in a game episode include putting on tag belts, discussing how to play the game and playing *What is the time Mr. Wolf?* with John (a child) as the wolf.

An inter-action is the moment-by-moment knowing action by knowers. These knowing actions include what the knowers do and say in context and the knowledge embodied in the actions and words.

2.4. View of curriculum as process embodied in the conceptual framework

2.4.1. Complicity of systems of curriculum, knowers and knowledge

None of the systems in the conceptual framework exists in isolation. Instead, the systems are coupled [2.2.3] to each other so that while each is an independent system, it is responsive to influences from the other two nested systems. The relationship among the three systems in the conceptual framework is also one of complicity [1.3, 3.3] which gives rise to changes in all three systems.

2.4.2. Timescales

The purpose of the thesis exploration to use complexity thinking to occasion and describe emergence in children's games of chase [1.1] means that the thesis involves researching

emergence [3.1]. Lemke and Sabelli (2008), Davis and Simmt (2003), and Davis and Sumara (2006) assert that researchers who research emergence need to identify the level(s) of emergence and the level below it/them. In addition, researchers need to be aware that different levels of a complex system operate at different timescales. In this thesis, this means that in the nested system of curriculum, the time it takes for a level to emerge varies. For example, it is reasonable to suggest that an episode level curriculum can take minutes or hours to emerge, an activity level curriculum can take days or weeks to emerge, a centre level curriculum can take weeks, months or years to emerge while a national level curriculum may take years or decades to emerge.

2.5. Implications for curriculum design

2.5.1. Levels of emergence in this research

Since researching emergence means identifying the level(s) of emergence and the level below it/them, I identify the following level(s) of emergence in this thesis:

- Emergence of individual and group knowledge in the system of knowledge,
- Emergence at level of the group in the system of knowers,
- Emergence at the levels of activity and episode in the system of curriculum.

Identifying these levels of emergence does not mean that the other levels are irrelevant; the notion of complicity [1.3, 3.3] implies that they mutually influence each other, but are not the focus of this research. Furthermore, the complicit relationship among the three systems suggests that data collection and analysis should include data related to all the three systems of knowers, knowledge and curriculum.

2.5.2. Levels of curriculum as an organising structure

By conceptualising curriculum as a nested system, as a teacher-researcher-curriculum designer, I was able to organise my teaching and data collection around episodes of an activity so that each episode counted as a bounded case. However, I did not need to restrict my teaching and data collection to only games of chase since it was possible to consider conducting an activity that was indirectly related to games of chase.

In addition, during data analysis, I organised and displayed data using episodes and activities as the two units of analysis. I found this useful when trying to describe emergence in curriculum at the activity level since episodes were complicit in emergence at activity level.

Chapter 3
Curriculum as process: A theory for emergence

Chapter 3 is an element of Thread 2: Curriculum design. It presents a process view of curriculum in the form of a theory for emergence.

Summary: In this chapter, I

- explain the concepts of emergence, structural drift, self-organisation and complicity
- describe the conditions for emergence and its relationship with the concept of enabling constraint,
- discuss the implications of the theory for curriculum design.

3.1. Notion of emergence

Emergence refers to the creation of new higher-level patterns (that is, at system level) that arise from the complex interactions of agents that make up the system (that is, interactions at sub-system level). The concept suggests that

> (1) there is an outcome of higher-level complexity (that is, the emergent phenomenon) than the lower-level entities/agents/sub-systems that give rise to it, and
>
> (2) there are one or more processes which involve complex interactions of these lower-level entities.

Thus, emergence can be described as a complex phenomenon that involves systems, processes and outcomes.

Emergence can be unintended or occasioned by a knower. In unintended emergence, emergence happens without any intention by any knower to create emergence whereas in occasioned emergence, a knower intends for it to occur. However, in occasioned emergence, the presence of an intention by a knower to create emergence does not necessarily mean that the knower knows what the emergent phenomenon will be. Both forms of emergence can occur in games of chase and it is important for a teacher to identify any unintended emergence he/she does *not* want to occur, for example, children hurting others [8.1.1], so that he/she can recognise and address it as it is emerging.

3.1.1. Emerging and emergent patterns

A knower who participates in or observes an emergent phenomenon can sometimes be surprised by the higher-level pattern that emerges (Casti, 1994). Hence, unpredictability is a feature of emergence. However, an emergent phenomenon can be foreseeable in the sense that the knower may be able to sense that something is emerging but cannot predict its details, that is, he/she does not know the details related to this emergence; what the pattern is, what it will look like and/or when it will become clear. This is especially true when highly complex systems interact.

The above paragraph helps to clarify a distinction between a phenomenon that is emergent and one that is emerging. An emergent phenomenon is one whose pattern is clear and stable enough to be recognised and even described. On the other hand, an emerging phenomenon is one whose pattern can be noticed or sensed but is in a transient state so that any pattern a knower recognises may be tentative. Hence, at any point in time, it may be useful to consider

the pattern's stability as a criterion to distinguish between an emerging and an emergent phenomenon.

3.1.2. Phenomenology and emergence

Capra (2003) asserts that an emergent characteristic usually refers to "a series of emergent phenomena at different levels of complexity" (p. 37). He uses sweetness of sugar as an example to illustrate this assertion. At one level, sugar is the emergent pattern we recognise as the physical manifestation of the interactions of hydrogen, carbon and oxygen bonds. At a different and higher level of complexity, the sweetness of sugar is a pattern that emerges from the interactions of the sugar with the chemistry of our taste buds when we taste it; it is a pattern that many of us recognise. The interaction of sugar with our taste buds is a subjective experience as is our recognition of sugar, and it is in this sense that emergence is phenomenological and in the eyes of the beholder. This phenomenological nature of emergence applies to this research in terms of recognising what counts as an emergent phenomenon in games of chase. Thus, in teaching, any emergent pattern a teacher recognises is phenomenological and furthermore, he/she becomes part of the phenomenon in the way he/she recognises the pattern that emerges.

3.2. Structural drift and self-organisation

Two key processes that give rise to emergence in complex systems are structural drift and self-organisation (Davis, 2004). These processes involve interactions among agents in ways that are iterative, recursive or a combination of both [Coupled knowledge 3.1]. However, while structural drift is a process of gradual change, self-organisation is a process of spontaneous and uncontrolled change that kicks in when the system is at the edge of chaos [Coupled knowledge 3.2]. Cohen and Stewart (1994) assert that complex systems have a natural tendency to drift towards the edge of chaos; hence both structural drift and self-organisation are important processes in complex systems.

Coupled knowledge 3.1: Comparing iteration and recursion

Iteration and recursion are both non-linear processes. In both cases, the processes are repeated and there is a feedback loop between the outcome of the process and the process itself. Thus, when used in the context of knowledge, both iteration and recursion are processes that enable knowledge to be elaborated and expanded on, but in different ways.

In iteration, the outcome of each repetition of the process becomes the starting point for the next repetition. Each repetition is referred to as an iteration. For example, different drafts of the thesis report count as different iterations of the process of writing the thesis.

In recursion, a particular step in the process is repeatedly called in a nested way. Each repetition or recursion results in the opening of a new space. When the recursion in a particular space is completed, the process returns to the space prior to this particular space. Fleener (2002a) refers to this return phase of the process as a backwards traverse. Thus, recursion involves revisiting previous spaces while iteration does not. Fleener also argues that recursion is more than mere repetition because it includes the need for reflection and evaluation not found in mere repetition. In this thesis, recursion is embedded in the thesis structure [1.5.4].

Coupled knowledge 3.2: Edge of chaos

Keirsey (1999) proposes that a system can operate in three regions, that is, the order region, the chaos region and the edge of chaos region. When a system is operating in the order region, it is stable which means that a disturbance does not trigger change in its patterns of behavior and the system returns to its normal patterns after the disturbance. When a system is operating in the chaos region, it is unstable and a disturbance can trigger a drastic change in the system's patterns of behavior. When it is operating at the edge of chaos, it is both stable and unstable, and can display unexpected patterns of behavior under certain conditions. The edge of chaos region represents a narrow indistinct region between the order and chaos regions (Keirsey, 1999) and represents a region between too little and too much order (Taylor, 2001). According to Cohen and Stewart (1994), complex systems have a tendency to move towards the edge of chaos.

Structural drift is also called natural drift and refers to the gradual process of change in a structurally-coupled system (Maturana & Varela, 1998). As this system continually interacts with its environment and other systems to which it is coupled, these interactions trigger gradual changes to the system's structure. These changes move the system towards the edge of chaos where the system can undergo dramatic changes to its structure through a process of self-organisation.

Self-organisation refers to a bottom-up process where there are no clear leaders among the agents in a system; the leadership role is dynamic and distributed among the agents. When there are sufficient numbers of agents that are iteratively and/or recursively interacting with each other, a new pattern or property can spontaneously emerge for the system as a whole.

The specific mechanisms for structural drift and self-organisation vary across systems, that is, they look different in different systems. The rules for these processes can be few and simple; complex interactions do not necessarily mean complex rules. It is often the case in emergence that lower-level agents use simple rules iteratively and/or recursively in their interactions with each other. It is this iterative and recursive nature of the interactions that makes the interactions as a whole complex, prompting writers like Cohen and Stewart (1994) to refer to the interactions as "indescribably complex" (p. 6).

3.3. Complicity as co-emergence

When complex systems undergo structural drift and self-organisation, they can change in ways that are surprising and unexpected (Capra, 2003; Maturana & Varela, 1998). Such complex systems are said to co-emerge with the systems to which they are structurally coupled and each system is said to be complicit in the changes that take place to the other systems to which it is structurally coupled (Davis & Sumara, 2006). Thus, these systems move or change together although not necessarily in step with each other, and the change process is "mostly gradual with occasional sudden changes" (Stewart, 2007, p. 10).

Cohen and Stewart (1994) use the word 'complicity' to describe this type of co-emergent change. They explain that complicity involves iterative interactions of complex systems that are all eventually changed beyond recognition. In their 'new' or emergent forms, the systems can do what they could not do previously (Stewart, 2007). Complicity carries connotation of entanglement, making it difficult to clearly describe the interactions that have unfolded.

Although a complex system can change in ways that cannot be predicted, the emergence of this change can be occasioned or nurtured by setting up certain conditions (Davis & Sumara, 2006; Fullan, 1999; Johnson, 2001). These conditions are referred to as conditions of emergence, and in this thesis, I also refer to them as conditions *for* emergence because there was an explicit intention to occasion emergence in this research.

3.4. Conditions for emergence

The conditions for emergence represent the environments the agents in a system operate or live in that can prompt emergence to unfold. Johnson (2001), Davis and Simmt (2003), and Davis and Sumara (2006) articulate conditions for emergence differently. Johnson (2001) identifies four necessary but not sufficient conditions: (1) paying attention to neighbourly interactions, (2) recognising visible and invisible patterns, (3) feedback and (4) indirect control or decentralisation. Davis and Simmt (2003), on the other hand, identify five conditions: internal diversity, redundancy, organised randomness, decentralised control and neighbour interactions. Davis and Sumara (2006) draw from the latter but differentiate organised randomness into the conditions of coherence and randomness so that there are six conditions for emergence. In this thesis, I use the conditions identified by Davis and Sumara (2006) based on their assertion that these conditions have been selected among many others on the basis that they can be tinkered with by teachers or educational researchers and therefore seem useful.

In the context of learning, living or complex systems, the conditions for emergence have the following meanings:

- *Coherence* is a feature of the system that relates to its agents' capacity to make sense of the system in which they operate or live.
- *Randomness* is a feature of the system that relates to the unpredictability and uncertainty affecting the system from within and outside the system.
- *Internal diversity* is a feature of the system that relates to its agents' capacity to be creative in their responses to interactions among themselves and to the system's interactions with its environment.
- *Internal redundancy* is a feature of the system that relates to its agents' capacity to recognise their commonalities and respond to these commonalities in similar ways.
- *Neighbour interactions* are features of the system that relate to its agents' capacity to interact and share knowledge among themselves.
- *Decentralisation* is a feature of the system that relates to the structure of neighbour interactions which contribute to the agents' capacity to simultaneously be independent of and respond to each other.

Five of the six conditions above are framed in terms of the agents' capacity because they relate to the agents' collective power to create each of these conditions. This collective power, in turn, arises from the coupling of individual agents and their environment. This implies complicity, that is, an entangled relationship, among the agents, their environments, the system and its environment and given their dynamic natures, capacity and conditions are also considered to be dynamic.

3.5. An enabling constraint and conditions for emergence

An enabling constraint refers to a set of conditions that agents in a system operate or live in which can (1) enable agents in the system to act creatively within the system's boundaries and (2) benefit the system as a whole. Thus, an enabling constraint connotes simultaneous references to a system's internal structure and its agents' external environment. Davis and Sumara (2006) describe an enabling constraint as

> "the structural conditions that help to determine the balance between sources of coherence that allow a collective to maintain a focus of purpose/identity and sources of disruption and randomness that compel the collective to constantly adjust and adapt." (147)

An enabling constraint is characterised by sufficient coherence and randomness in a system. The notion of 'sufficient coherence and randomness' carries the connotation of enough of each and a balance of both, giving rise to a system structure that is both constrained and flexible. This enables the system as a whole, when viewed as a system with multiple identities, to preserve its identity as a living or complex system while developing other identities.

There are two sources of coherence in a system, that is, its boundaries and the commonalities shared by its agents. A system's boundaries refer to both its internal boundaries, that is, boundaries within the system, and external boundaries, that is, those that define the external limits of the system. Boundaries can take the form of physical limits, conceptual boundaries, processes or rules, be imposed on the system and/or negotiated from within. However, boundaries in learning systems are dynamic, that is, their forms can change, some boundaries can be removed, new ones created and the strength of their coherence can vary over time. Despite their dynamic nature, a system's boundaries contribute to coherence as long as agents can recognise them.

A second source of a system's coherence is the commonalities that agents share, that is, the system's internal redundancy. These commonalities are facets that agents in a system share and respond to in similar ways. When there are enough agents that share and respond to enough common facets, agents can carry out another agent's role when the latter is unable to do so because the other agents know enough about the role to carry it out; this enables the system's continued existence. Internal redundancy can be created by allowing agents in a system to interact sufficiently with each other and share knowledge; these internal interactions among agents are referred to as neighbour interactions.

When neighbour interactions are organised in a decentralised or scale-free structure, this structure of interactions balances the efficiency and robustness of the knowledge flow (Davis & Sumara, 2006). There are two features in interactions with a decentralised structure: (1) an emphasis on interactions and decision-making that are local or short-range (Johnson, 2001) and (2) sufficient loose couplings or weak links (Davis & Sumara, 2006) among the agents. Local interactions and decision-making among agents enable them to share knowledge and respond to each other efficiently, thereby contributing to the system's coherence and internal redundancy. Loose couplings among agents increase the robustness of the system as a whole by drawing upon the system's internal redundancy to facilitate continued flow of knowledge and decision-making capability when necessary, for example, in the event of disturbances

that incapacitate an agent's ability to perform its role. Thus, a decentralised structure for interactions among agents allows agents to be simultaneously responsive to and independent of each other.

Randomness in a system can arise from the neighbour interactions of the system's agents or from the system's interactions with other systems. The former generates randomness from within the system because it is each agent, as a structurally-determined system, that determines its own response(s) to the interactions. The system constrains but does not determine the agents' responses and therefore does not know in advance what its agents will do. The range of varied responses among interacting agents counts as the system's internal diversity, which, in turn, enables the system to respond to external perturbations in a variety of ways.

When the system responds to external perturbations, its response becomes a perturbation to other systems to which it is structurally coupled. These other systems, in turn, determine their own responses to the perturbation and the disturbing system cannot know in advance what these responses will be. These responses feed back to the system as randomness from a source external to itself.

Thus, when agents in a system perceive their conditions as an enabling constraint, the system's structure emerges as an enabling constraint. Under these conditions, the system as a whole is capable of responding to internal and external sources of randomness in ways that can be creative and mutually beneficial to itself and its agents.

3.6. Implications for occasioning emergence in games of chase

3.6.1. The challenge to identify conditions for emergence

To summarise, the theory for emergence in this thesis presents an understanding of emergence that has the following features:

- Emergence embodies the idea that a system and its agents are simultaneously distinct from and responsive to each other; this idea is consistent with the structural view of curriculum [Chapter 2].
- Emergence can be unintended and occasioned, that is, it can happen unintentionally and intentionally.
- Emergence can refer to an emerging pattern or an emergent pattern, and the stability of the pattern can be used to decide whether a pattern is emerging or emergent.

- Although emergence is a naturally occurring phenomenon that can exist beyond an observer's knowledge, the observer who recognises emergence becomes a part of the phenomenon in the way he/she recognises the pattern that emerges. This idea is consistent with the notion of curriculum-knower-knowledge couplings in the structural view of curriculum [2.3].
- Emergence involves gradual and spontaneous changes in a system over time through the processes of structural drift and self-organisation respectively.
- Emergence can be occasioned by creating an enabling constraint, which is a set of structural conditions in a system that can enable the system to respond to internal and external randomness in ways that are creative and mutually beneficial to itself and its agents.

Given this understanding, I discuss three challenges I faced in trying to occasion emergence in games of chase at the Centre. Firstly, there was a challenge for me to identify what these conditions and processes looked like at the Centre since specific conditions and processes by which emergence can occur are different in different situations (Davis & Sumara, 2006).

Secondly, there was an on-going challenge during the teaching phase to create an environment where the conditions were self-generating or sustainable. This challenge arose because the concept of an enabling constraint does not mean that conditions are fixed or measurable in any particular setting. Instead it carries a connotation of a range of possible sets of conditions that may be suitable and what counts as sufficient coherence and randomness can only be sensed (Doll, 2008). The dynamic nature of the conditions also means that, in the context of the Centre, these conditions could and were likely to change over time.

Thirdly, even after setting up an enabling constraint at the Centre, there was a challenge to make emergence happen because the presence of an enabling constraint does not guarantee that emergence will occur. While creating an enabling constraint is necessary in occasioned emergence, emergence cannot be scripted or forced into existence (Davis & Sumara, 2006) because it only unfolds in the complex on-going interactions of the systems of knowers, knowledge and curriculum. Since on-going interactions are an important feature of emergence, this also means that we cannot fully anticipate what the outcome(s) of emergence will be. Thus, the concept of emergence suggests a coupling of both the designed and emergent aspects of curriculum.

3.6.2. Identifying existing and new conditions for emergence

Based on the three challenges discussed above, during the teaching phase, I acted to (1) identify existing conditions at the Centre that could be counted as sources contributing to coherence, randomness, internal diversity, internal redundancy, neighbour interactions and decentralisation, (2) identify other conditions that were not present but which I deemed necessary and could be created, and (3) weave the existing and new conditions into the curriculum design. Chapter 4 identifies the existing conditions, Chapter 8 identifies some other conditions that needed to be created, and Chapter 9 describes some of the ways these existing and new conditions were weaved into the games of chase curriculum.

Chapter 4
Contexts

Chapter 4 is an element of Thread 1: Research methodology and design. It presents two important contexts that are complicit in this thesis: (1) Te Whāriki (Ministry of Education, 1996), the national ECE curriculum, (2) the Centre context.

Summary: In this chapter, I

- describe Te Whāriki (Ministry of Education, 1996), which represents the wider ECE context of Aotearoa/New Zealand,
- describe the Centre context, which represents the immediate context of the thesis in terms of the Centre community, the patterns of daily arrivals at the Centre, the teachers' roles, the outdoor environment as well as the Centre curriculum and daily programme,
- discuss aspects of the Centre context that could count as conditions for emergence that I could and did draw upon in my research.

4.1. Te Whāriki

Te Whāriki (Ministry of Education, 1996), the New Zealand early childhood curriculum document, was published following ten years of development by the early childhood sector. This development has included a strong Māori influence and the curriculum embraces biculturalism both in principle and in practice (Nuttall, 2005).

Te Whāriki is underpinned by a sociocultural approach to ECE. According to Hedges (2003), this approach views children as "powerful and competent, and continuing to grow in competence through participation in educational and socially and culturally valued activities" (p. 7). This view is articulated in its vision for children

> "to grow up as competent and confident learners and communicators, healthy in mind, body and spirit, secure in their sense of belonging and in the knowledge that they make a valued contribution to society." (Ministry of Education, 1996, p. 9)

The curriculum consists of four principles and five strands [Coupled knowledge 4.1]. The principles serve as guiding principles for curriculum design and curriculum dynamics while the strands represent the essential areas of learning and development. The relationships between each strand and the principles are made explicit in the curriculum document. Within each strand are a number of goals which are the aims related to the strand; these are summarised in Appendix A. Each goal, in turn, embodies a range of learning outcomes, knowledge, skills and attitudes that can be observed and nurtured.

Coupled knowledge 4.1: The principles and strands of Te Whāriki (Ministry of Education, 1996)

Te Whāriki principles

- *Empowerment/whakamana*: The EC curriculum empowers the child to learn and grow
- *Holistic develop/kotahitanga*: The EC curriculum reflects the holistic way children learn and grow
- *Family and community/whānau tangata*: The wider world of family and community is an integral part of the EC curriculum
- *Relationships/ngā hononga*: Children learn through responsive and reciprocal relationships with people, places and things

Te Whāriki strands

- *Well-being*: The health and well-being of the children are protected and nurtured.
- *Belonging*: Children and their families feel a sense of belonging.
- *Contribution:* Opportunities for learning are equitable and each child's contribution is valued.
- *Communication:* The languages and symbols of their own and other cultures are promoted and protected.
- *Exploration:* The child learns through active exploration of the environment.

It is mandatory for each early childhood centre receiving funding from the government to use Te Whāriki as the basis for developing its own centre curriculum. The early childhood curriculum is conceptualised as a whāriki or woven mat that is created by weaving the principles, strands and goals articulated in the document. This whāriki metaphor enables each early childhood centre to weave its own distinctive curriculum patterns by coupling the principles, strands and goals with its own distinctive programme, philosophy, structure and learning environment. In this way, Te Whāriki simultaneously embraces a common national curriculum as well as diversity of centre curricula.

4.2. Centre context

4.2.1. Background

I chose to do my research at the early childhood centre where I had taught for ten months before the start of my PhD studies in April 2008. More specifically, it was a unit for mainly three- and four-year olds at an early childhood centre attached to the university. I chose the Centre because I had already established many relationships with the community and was familiar with many facets of the Centre context. I felt that these relationships and knowledge could benefit both the community and me. Despite this, there were some facets of the Centre context that had changed in the eight months before I returned to the Centre for my research.

4.2.2. Centre community

The unit (the Centre) operated on a full-day license with a maximum daily roll of 32 children. There were 41 children enrolled at the Centre, most of who were children of staff and students at the university. Each child attended the Centre between three to five days a week.

At the time of the research between January and April 2009, the children were just returning to the Centre after a three-week holiday over Christmas and New Year. During this period, nine new children joined the Centre and five were transitioning into this unit from the unit for 2-year olds, which meant that they spent time in both units. One child turned five years old and left to start school.

The number of children attending on a day-to-day basis ranged between fifteen and thirty; the lower attendance tended to coincide with the school holidays in January and early February, with the attendance steadily increasing thereafter.

At the start of the research, the unit had three full-time qualified teachers. During the fourteen weeks, there were some changes to the teaching team. One qualified teacher, two part-time teachers who were studying for their early childhood qualifications and a new

support staff member who relieved teachers for their breaks joined the team at different times. One teacher went on maternity leave and was replaced by another teacher from a different unit. There was also a student-teacher from the university doing her placement at the Centre. The teacher-to-child ratio was 1:8 and the student-teacher was not counted as part of the ratio. The Centre employed relievers to maintain the ratio if any of the teachers were away.

4.2.3. Arrival times

Each morning, teachers would begin work at staggered times, that is, 8 am, 8.15 am and 8.30 am. By 8.30 am, all the teachers would have arrived and the number of teachers 'on-ratio', that is, teachers counted as part of the teacher-to-child ratio, would depend on the expected attendance for the day. The extra teachers would 'go on non-contact', that is, work on planning, assessment or administrative tasks in the staff room and therefore not be counted as part of the teacher-to-child ratio.

The children and their families arrived at varying times. A small number of children would arrive at the opening time of 8.15 am, most just before 9 am and a small number after that. By the end of morning tea at 10.30 am, all the children would have arrived.

4.2.4. Teachers' roles

There were three rostered teachers' roles at the Centre, that is, the roles of the inside teacher, the outside teacher and the float teacher. The inside teacher was in-charge of setting up the inside area in the morning and supervising the inside area. The outdoor teacher was in-charge of setting up the outside environment and supervising the area. The float teacher moved between the two areas and was in-charge of supporting some children with their toileting routines. She would accompany these children to the toilet twice in the morning, generally between 9.45 am and 10 am and between 11.30 am and 11.45 am. Teachers would rotate roles weekly.

Each morning, teachers would take turns to go for a 15-minute rostered morning tea. The first teacher would go at 9.30 am and her role replaced by a teacher who had been on non-contact that morning; this enabled the teacher-to-child ratio to be maintained. When the first teacher returned, the second would go and her role also taken by the teacher on non-contact. This changeover pattern would continue until all the teachers had had morning tea. A similar pattern of changeover took place for teachers' rostered hour-long lunch breaks, which started at 11.30 am.

4.2.5. Outdoor environment

The Centre's outdoor environment is sketched in Figure 4.1. It is spacious with three main areas, defined by the type of surface, that is, the rubber mat area 1, the bark area and the concrete area which also encompassed a second rubber mat area. Some work was done to replace the surface of the second rubber mat area between 23 January and 2 February, which meant that the entire concrete area was not available for use during that time.

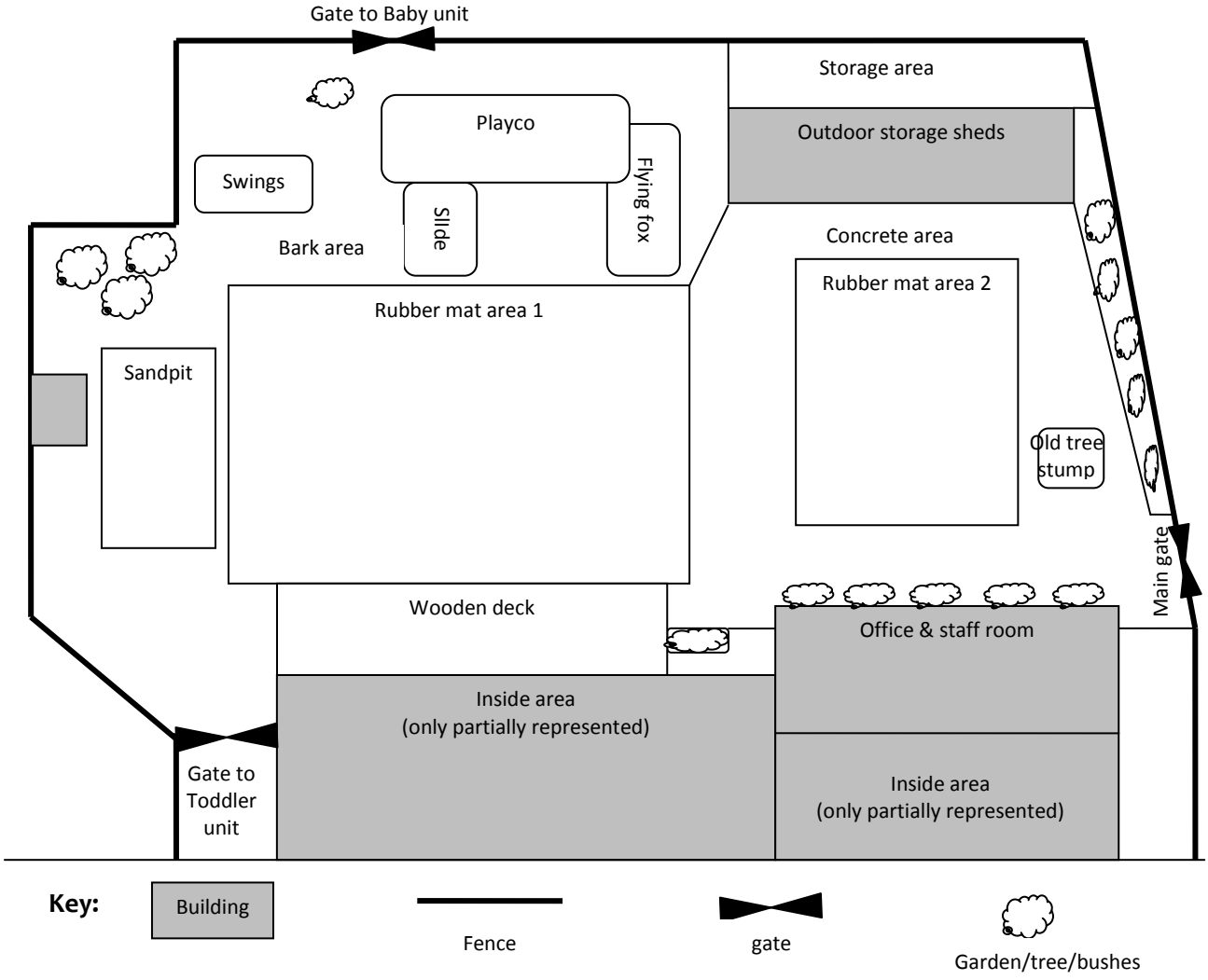


Figure 4.1: Spatial representation of outdoor environment (not to scale)

Some of the permanent playground equipment included the sandpit, swings and Playco equipment which incorporated climbing ladders, bridge, slide and flying fox. Movable climbing equipment was stored in the outdoor sheds and certain equipment taken out in the mornings for use. There were also three large wooden climbing boxes that were movable,

but remained outside and could be incorporated into any obstacle course that the teachers and children set up.

Children were allowed to move freely between the outdoor and indoor areas as long as there was a teacher outside. The other visible rule for children playing in the outdoor area was that they could ride the tricycles and scooters only on the concrete area.

4.2.6. Centre curriculum and daily programme

The Centre's curriculum focused on play and following children's interests. With the exception of morning tea, mat time and lunch, children could generally choose to engage in any activity that was available. They could also request for activities and were allowed to be inside or outside as long as there was a teacher supervising the area.

Generally, teachers and children would focus on activities indoors between 8.15 am and 9 am. Activities that were available every day included reading, puzzles, playdough, art and craft, dress ups and blocks. The selection of books, puzzles and dress ups were changed every few weeks. Each day, teachers would also bring out a selection of toys, for example, special puppets and threading toys, for children to play with. Over the course of the morning, the inside teacher might organise a music activity or read stories to children who chose to be inside.

At about 9 am, depending on the weather, one of the teachers would check the outdoor environment and set up any play equipment. These might include opening the sandpit, bringing out the tricycles and scooters as well as setting up any movable equipment such as boxes, planks and spongy shapes. The decision on what to set up rested with the teacher who was setting up the outdoor area. However, over the course of the day, teachers and children could also make changes to the environment. As the morning unfolded, teachers who were outside helped children to put on sunblock or sunscreen and ensured that children had their hats on.

At about 10 am, everyone would gather for morning tea which would last for about thirty minutes. If the weather was fine and warm, we would have morning tea on the outside deck area; otherwise morning tea would be inside. After morning tea, the children would disperse to continue their activities or choose to do something different.

Mat time was at about 11.45 am. During this time, everyone got together to read some stories or do a music activity and after about twenty or thirty minutes, the children would wash their hands in preparation for lunch.

4.3. Sources of conditions for emergence and implications for the games of chase curriculum

Table 4.1 discusses some facets of the Centre context that contributed towards conditions of coherence, randomness, internal diversity, internal redundancy and neighbour interactions. They were existing conditions at the Centre that could be counted as sources of conditions for emergence [3.6.2].

Table 4.1: Facet of Centre context and its contribution to the conditions for emergence

Facet of Centre context	Description of context and its contribution to conditions for emergence
Centre community	• The daily variations in children and teachers attending the Centre counted as internal randomness in the system of knowers. These variations were also sources of diversity in the system of curriculum because the number and composition of children and teachers influenced the activities that unfolded on a day-to-day basis. • The changes in the composition of teachers during the research counted as external perturbations and randomness in the system of knowers. However, the presence of a core group of teachers counted as a source of internal redundancy (stability) and coherence to this system. Initially, there were three teachers in the core group and that increased to six by mid-February. • The movement of children into and out of the unit counted as external randomness in the system of knowers and contributed to diversity in the system of knowledge. However, there were enough children who were experienced in this unit to contribute towards the system's internal redundancy and coherence.
Arrival times	The patterns in the teachers' and children's arrival times were loosely coupled to the Centre programme in the sense that these arrival patterns guided the patterns of activities that unfolded in the morning, and vice-versa. Thus, both sets of patterns counted as sources of coherence in the systems of knowers and curriculum. The day-to-day variations in these patterns counted as randomness arising from within the systems.
Teachers' roles	The teachers' roles were a source of internal redundancy and coherence in the systems of knowledge and curriculum because all teachers knew what these roles were and carried them out regularly. By enacting the teacher roles, children also learnt to know what the different roles were so that, for example, they would know what to do if they were approached by the float teacher and reminded to go to the toilet.
Outdoor environment	• The external physical boundaries (that is, fenced area) of the outside environment and the different surfaces within this environment were sufficiently visible to provide coherence in the system of knowledge in the sense that many children knew the boundaries and the expectations associated with them. However, there was inherent diversity and randomness in this knowledge since some children were new and some of the more experienced children might be inclined to test the expectations for the boundaries. • There was little to restrict children's observation of activities and movement within the

	outside area. This meant that children could easily notice and join in with what was happening in different parts of the outdoor area. This lack of restriction played a role in generating interests among children in other activities, that is, encouraging neighbour interactions in the system of knowledge.
Centre curriculum and daily programme	• The Centre's adoption of Te Whāriki as the basis for its curriculum means that there is coherence in the system of curriculum in the sense that it served as a common curriculum framework among teachers at the Centre. • The Centre's play-based and interest-based curriculum as well as the daily programme counted as sources of coherence in the system of curriculum. Knowledge of the curriculum and programme were sufficiently visible within the community to count as sources of internal redundancy and coherence in the system of knowledge. However, children also knew that they could request for activities, and this knowledge counted as a source of coherence in the system of knowledge. Their choices, in turn, could affect the balance of diversity and redundancy as well as coherence and randomness in the system of curriculum.

I carried out the above analysis after I left the Centre because while I was at the Centre, I did not know how to articulate the existing context in terms of conditions for emergence. However, I did tacitly sense or recognise many of the above contributions. This recognition gave rise to two important implications for curriculum design and dynamics. The first was that there was enough coherence and internal redundancy for me to introduce games of chase as a perturbation to the Centre's system of curriculum. The second implication was that I could expect varying levels of interests and participation among the children and teachers, given the play-based and interest-based nature of the curriculum and the dynamic nature of day-to-day life at the Centre.

Chapter 5
Data collection, generation and management strategy

Chapter 5 is an element of Thread 1: Research methodology and design. It presents the Research Data and Management System (RDMS) which I developed as the strategy for collecting, generating and managing data. The RDMS counts as a methodological innovation and a contribution to knowledge.

Summary: In this chapter, I

- explain two meanings of data collection and generation used in this thesis,
- describe and explain the RDMS,
- describe the patterns and variations in the ways I collected the teaching data,
- argue that the RDMS is an enabling constraint in the thesis methodology and design.

5.1. Two meanings of data collection and generation

In this research, I conceptualise data as both collected and generated. However, there are two overlapping but subtly different meanings to the notion of data collection and generation. The two meanings relate to the two different categories of data: personal learning data (PLD) and teaching data. Personal learning data was collected over the entire duration of the research while teaching data was collected during the teaching phase [1.5.1].

5.1.1. Collection and generation of personal learning data

With regards to the personal learning data, data collection and generation involves a coupled relationship between qualitative data and personal knowledge, which is summarised in Figure 5.. Data that is made sense of becomes knowledge, which, when recorded, becomes new personal learning data. Thus, data collection is a process of recording personal learning data while data generation is a process of using data to create knowledge, which is then recorded as new data.

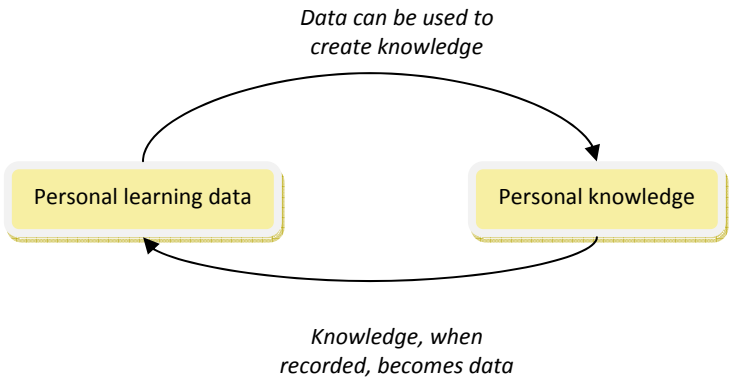


Figure 5.1: Data collection and generation in personal learning data

This process of data generation is iterative and recursive in nature [Coupled knowledge 3.1]. In data generation that is iterative, new knowledge is used as a starting point for creating other knowledge. In a recursive process, prior knowledge is re-visited in the light of new knowledge. Thus, data and personal knowledge draw upon and feedback on itself and each other, and in the process, both evolve and change.

5.1.2. Collection and generation of teaching data

The notion of data collection and generation during teaching emerged from my teacher-researcher role and my intention to influence children's learning. I agree with Coghlan and Brannick (2005) that asking questions serves as a means of both collecting research data and for generating learning data for both the researcher and participants. Thus, teaching acts generate learning data for both children and the teacher, which are collected. In my research, some of the collected data were also used in other activities, thereby creating a blurred boundary between what counts as data collected or generated. For example, as shown in the

Visual Summary [Attachment], the day after we played the game *Bird and Bees* [RMG4], some children and I watched videos of the episode [WVP1] and this viewing prompted us to play the game again [RMG5]. This example counts as an example of recursion in the collection and generation of teaching data because it involved revisiting a game and subsequently playing a new episode of the game.

5.2. The Research Data Management System as strategy

My overall data collection, generation and management strategy was based on and co-emerged with the conceptual framework [Chapter 2], the theory for emergence [Chapter 3] and the notion of an emergent methodology [1.4]. It involved collecting data that would meet the following criteria:

- The data could be used to re-create and re-present the curriculum related to games of chase and other emergent phenomena.
- The data could enable me to show the complicity of the different levels of curriculum and that of knowers and knowledge in the unfolding curriculum.
- I could use the data as a means of generating both curriculum and ideas or thinking, which, in turn, could be used to generate more data.

Based on the above criteria, two categories of data were collected, that is, data during teaching which I collected during the teaching phase and personal learning data which I collected during all three phases. The former focused on collecting and generating data related to (1) what the children and I did in the planned and unplanned curriculum, (2) how the activities in the curriculum unfolded, and (3) the knower-knowledge relationships in the activities (that is, who said and did what and how). The latter was data related to my learning as teacher, researcher and game/curriculum designer.

The sampling strategies used were purposeful sampling and opportunistic or emergent sampling (Patton, 2002). Patton points out that purposeful sampling involves selecting cases that are rich in information and highlight the phenomenon the researcher is interested in studying. In this thesis, the phenomenon I was studying was the games of chase curriculum with teaching and learning as co-implicated phenomena. Opportunistic or emergent sampling, on the other hand, meant taking advantage of new opportunities during data collection and being open to following wherever the data led me to. For example, I began collecting data on children's engagement in socio-dramatic play when I noticed children's

interest in this activity and recognised its potential as a facet of the games of chase curriculum [10.2.3, Attachment].

I created the Research Data Management System (RDMS) as the strategy to meet the above criteria and expectations. It is based on database concepts (Mata-Toledo & Cushman, 2000) and was a system that was intended to have the following features:

- It uses two different but coupled data or information management softwares to manage different data types, that is, Microsoft Outlook and Microsoft Access. Outlook is a database tool that is suitable for recording and managing personal learning data because it is a tool for keeping track of information of various types, including notes, tasks, journal entries. Access is the database tool I used to manage data that is not easily managed by Outlook, such as video recordings, audiorecordings, photos as well as documents created and collected during teaching. These database tools support and are supported by other Microsoft (MS) applications such as Word, Excel and Powerpoint.
- It can be used to manage the different data types described above, with the possibility of including other types and forms of data.
- It can be viewed as a decentralised system, composed of sub-systems that are loosely connected in some ways.
- The system and its sub-systems are complex adaptive systems that can grow, shift and change, and adapt to changing conditions and new learning over time.
- In this thesis, I focus only on facets of the system relevant to the collection, generation and management of the teaching data and the personal learning data.

5.3. Describing the Research Data Management System

The Research Data Management System (RDMS) is made up of two distinct but related sub-systems, that is, the teaching data sub-system and the personal learning data sub-system. The former is a system for collecting, generating and managing data related to the teaching phase of the research. The personal learning data sub-system is a system used for the personal learning data across all phases, including the teaching phase.

5.3.1. The personal learning data sub-system

Figure 5. identifies different types of PLD and the tools to record and/or generate them. The types of PLD are distinguished according to their form and purpose. For example, writing for learning and journaling for thinking are both forms of writing but the former refers more

to extended writing, for example, for writing a paper or a chapter, while the latter to shorter and more focused writing. Scribbles, memory flashes and pockets of ideas and insight are, on the other hand, notes of emergent thinking which are less coherent and more transient than writing for learning and journaling for thinking, but are recorded for their potential value in the future.

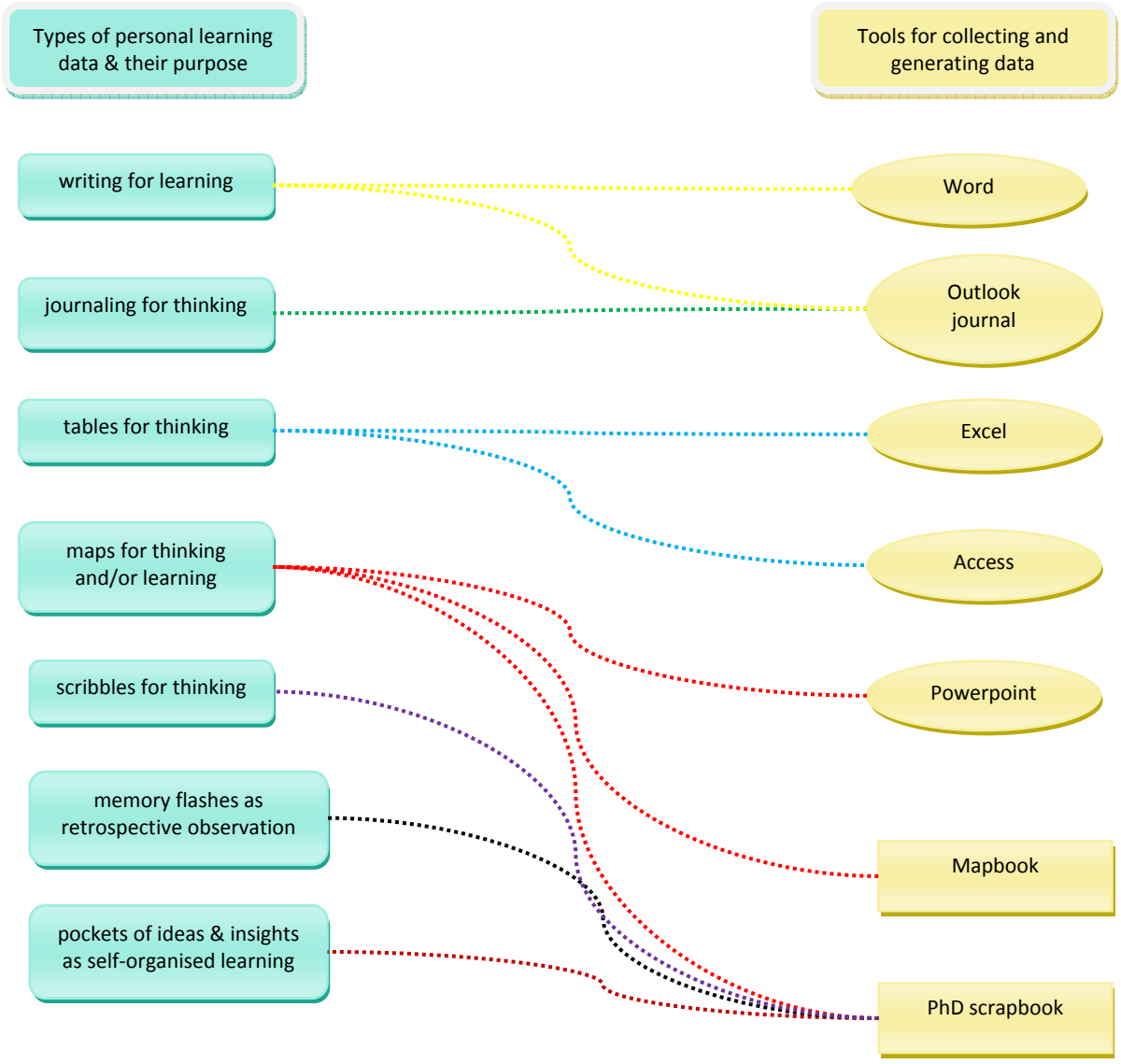


Figure 5.1: Types of personal learning data, their purpose and the tools used to create them

I used seven different tools to generate different PLD. They included physical tools such as the PhD scrapbook and the Mapbook as well as software application tools such as Outlook journal, Word, Excel, Access and Powerpoint. Some of the PLD, such as writing for learning, tables and maps, could be created using more than one tool. On the other hand, journaling, scribbles, memory flashes and pockets of ideas were created with one specific tool each.

The use of multiple types of PLD and ways of generating them increased the degree of flexibility in decisions related to the type of learning data and tools used based on the intended purpose and practical considerations at the time.

5.3.2. The teaching data sub-system

Figure 5. shows the types of data recorded and/or generated in the teaching data sub-system, their purpose(s) and the tools used to record them. In some cases, a particular data type was used for several purposes. For example, I created slideshows both as a teaching tool and for sharing with children, parents and teachers. In other cases, several data types served the same purpose as in the case of the BS journal, slideshows and movies, which were all used as teaching tools.

5.3.3. Conceptual overview of the RDMS

Figure 5. shows a conceptual view of the RDMS, which provides an overview of the elements in the RDMS. When read in conjunction with the key, this view summarises the relationships between the data, the tools and the processes in the system. For example, during teaching, I created summary fieldnotes as Outlook journal documents, which were automatically logged as journal entries in *Hanin's working Outlook folder*, an Outlook database. After the teaching phase ended, I copied the summary fieldnotes and its meta-data (information about the summary fieldnotes) into the *Summary fieldnotes* folder within the METHODS database. This latter process enabled quicker access to the summary fieldnotes and served to duplicate them.

It is not within the scope of this thesis to describe the following aspects of the RDMS: (1) the physical locations of the data, the system for naming the files and the processes to ensure data redundancy and security, (2) the system for labeling and referencing the data in the databases. These are summarised in Appendix B.

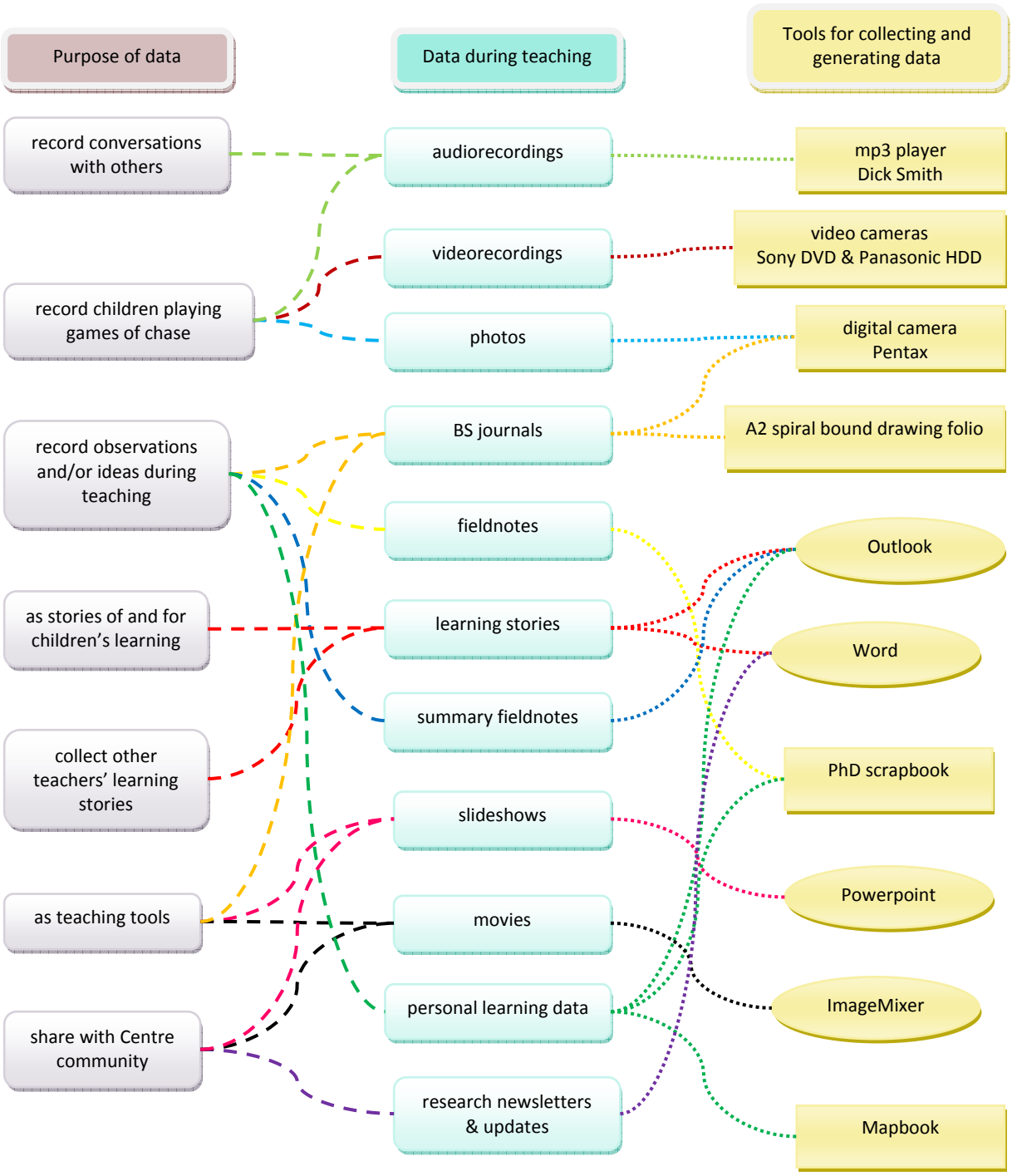


Figure 5.3: Data during teaching, their purpose and the tools used to collect and generate them

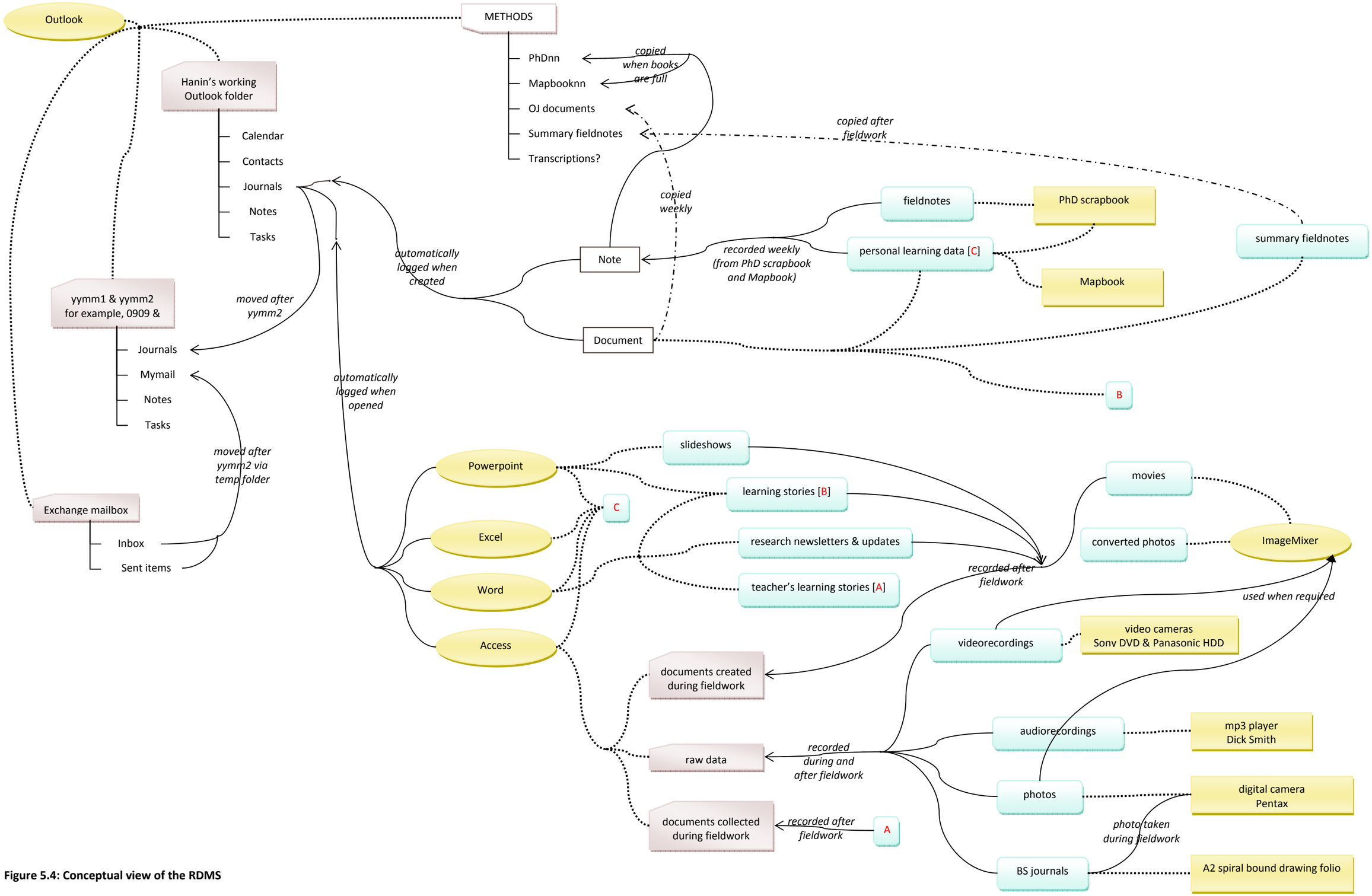
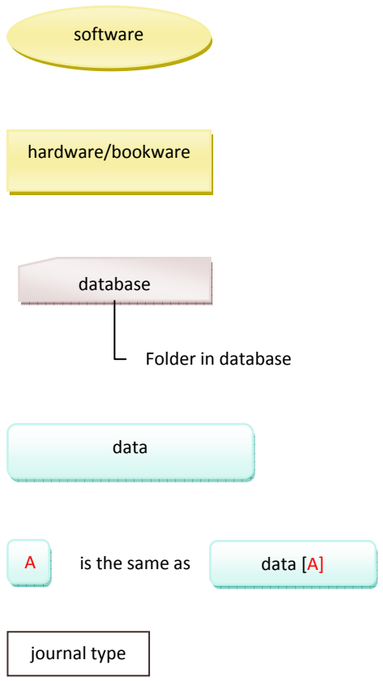


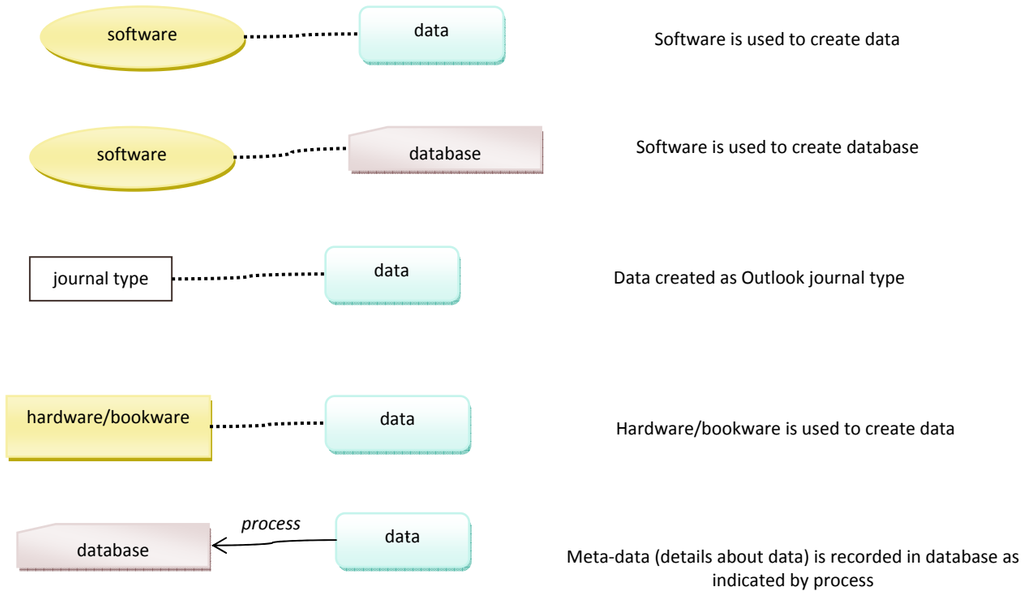
Figure 5.4: Conceptual view of the RDMS

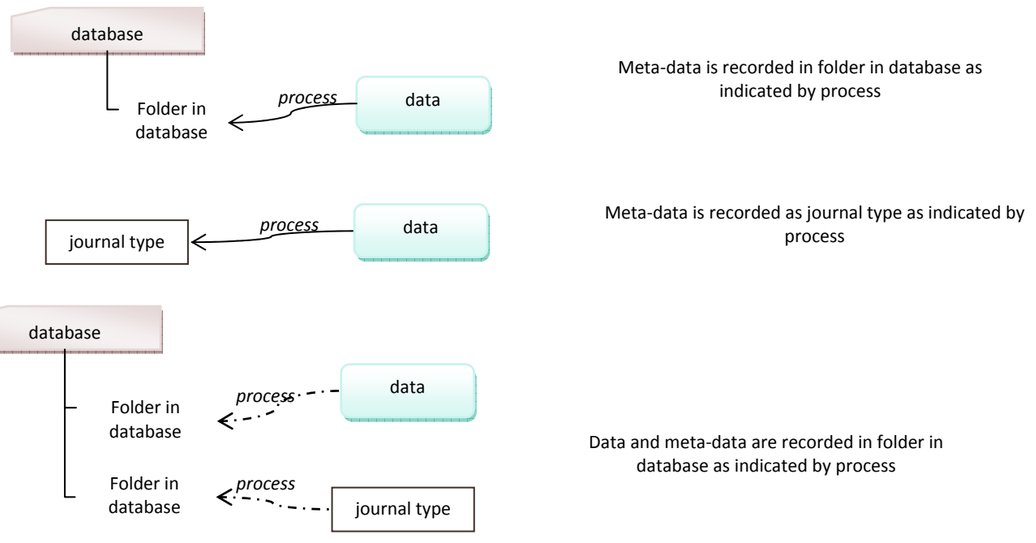
KEY TO Figure 5.4

Symbol key identifies entities in the RDMS



Relationship key identifies the processes and flows of data and/or meta-data





5.4. Patterns and variations in collecting teaching data

In this section, I describe and explain the patterns and variations that emerged in relation to the methods for collecting teaching data at the Centre. In this way, I provide a more detailed description and an explanation of the methods, both of which are not visible in Figure 5.4.

Below is an entry from my Outlook journal [Figure 5.2] which summarises the patterns or rhythm my research assistant, David, and I developed with our methods at the Centre. I wrote the entry to help me articulate the methods we had tacitly developed and to reflect on the justifications for the methods. The writing counts as an example of journaling for thinking [5.3.1, Figure 5.2].

> Over the past eight weeks at the Centre, David and I have developed our methods for collecting and organising our data. Briefly,
>
> - We place a Panasonic HDD (hard disc drive) camera on a camera stand which is secured to a tree near the gate. The Panasonic camera is used to capture videos of activities on the concrete area, which is where most of the games of chase take place. This videocamera gives us a wide field of view and is able to capture some of the conversations that take place in within that field of view. The hard disc can record 7 hours of continuous video data while the battery, when fully charged, can last well beyond the 3 hours we spend at the Centre. The files on this videocamera are downloaded on the computer in the afternoon using ImageMixer3.
> - David carries a Sony DVD Handycam with him to record close-up views of activities. The Sony records data on an 8 cm dual-side rewritable mini-DVD. Each side can record up to 30 minutes of video data after which David turns the mini-DVD to the other side to record more data. The data from the Sony is downloaded to the laptop using ImageMixer1.5 at morning tea time (10 am) and at mat time (11.30 am). The battery on the Sony lasts about 1 hour 20 minutes, and given this constraint, David makes the call as to what to record and for how long.
> - I carry a DSE MP3 player which is secured to my clothing so that it doesn't jiggle around too much. I find this method useful for collecting audiorecordings of conversations that take place while I am playing with children, and which I am likely to forget or cannot write because I am involved in the play. The recordings are downloaded onto the laptop at morning tea and mat time or in the afternoon.
> - I use a Pentax digital camera to take photos at the Centre. I also use the camera with children; I let them take photos with the camera and let them watch and/or participate in downloading the photos on my laptop using Camera Wizard. Sometimes, I download the photos in the afternoon.
> - I write down notes in my Scrapbook which I carry around with me at the Centre. The notes serve as memory triggers for my summary fieldnotes which I create as an Outlook journal entry in the afternoon. In my summary fieldnotes, I record the following information: number of children present by morning tea, teachers present, names of new children, weather, activities David and/or I did with the children and any comments (detailed notes).
>
> All photos, videos and audiorecordings are downloaded onto a folder on my desktop called 'raw data' and each file is given a name following the general format 'YYMMDD – general label – device label – specific label', although there are variations for data from the different devices. For example, the video file labeled '090305 - before am tea - p - playing lions, witches & chase' refers to the video taken by the Panasonic on 5 Mar 2009 before morning tea, and it is about the children and I playing lions and witches with some elements of chase.

> In the first few weeks at the Centre, I was able to store all my data on my desktop. However, as the volume of data increased, I found it necessary to move the data from my 'raw data' folder to a corresponding folder in my 320GB external drive so that my laptop hard disc does not run out of storage space. I usually do this in the afternoon after all the day's data have been downloaded and labelled.
>
> (OJ090311 – 1356 – Methods for collecting and organising data each day)

Although there were patterns in the ways the teaching data was collected and managed, there were also day-to-day variations in the methods. The sources of the variations included: (1) problems with the Sony DVD Handycam, (2) my research assistant unable to attend due to sickness and (3) the day-to-day happenings at the Centre. Thus, despite the pattern, I had to make daily decisions about methods, some of which affected data analysis later. Table 5.1 below summarises some of variations in the pattern for data collection during the four episodes of the game *Creep Up on Granny* [Chapter 10]. For example, I decided to write learning stories soon after playing the episodes labelled CUG3 and CUG4, but for slightly different reasons. During CUG3, although I was able to video record the episode, I had found it difficult focusing the video camera on the players while running. The result was some jerky scenes and some scenes focusing on the ground instead of the players. With regards to CUG4, I decided to write the learning story because I had only the photos as my data.

Table 5.1: Variations in data collection methods for episodes of Creep Up on Granny

Date	Episode code	Video recording	Audio recording	Photos
16 Feb 2009	CUG1	Initially, I carried the Panasonic in my hand and did the video recording as I played with the two girls because David was unavailable. When David returned, he took over the video recording.	I had the mp3 player on my waist.	I took some photos of the girls playing before I joined them.
5 Mar 2009	CUG2	Initially, the Panasonic was on the tripod and David held the Sony. Later when the Sony's battery was drained, David took the Panasonic off the tripod and held it in his hand.	I had the mp3 player on my waist	I did not take any photos.
19 Mar 2009	CUG3	David was sick that day so I held on to the Panasonic and recorded as I played with the children.	I had the mp3 player on my waist	I did not take any photos.
17 Apr 2009	CUG4	I did not take any video recording or audio recording because this was my last day at the Centre and I had not brought my video cameras or mp3 player. I had not intended to play any games with the children today because I had wrapped up the tag belts to give to the Centre as a present.		I used my camera to take photos as the children and I were playing.

5.5. The RDMS as an enabling constraint

The RDMS is a tool, a strategy and a system for collecting, generating and managing data. It is an enabling constraint within the thesis methodology and design because it enabled me to act flexibly and creatively within the boundaries of the system. As a system, it is coherent at the same time that it embraces randomness that can unfold in an emergent methodology [1.4]. The RDMS also embodies both structure and flexibility which emerge from the juxtaposition of the following features of the RDSM:

- It articulates the criteria for creating RDMS [5.2] which counts as a source of coherence,
- It recognises and conceptualises two coupled meanings of data collection and generation [5.1], both of which embody a relationship between qualitative data and knowledge,
- It includes two sub-systems which are clearly defined in terms of their relationship with the two categories of data [5.1] but flexible in terms of the diversity of forms, purposes and tools within each category [5.3.1, 5.3.2],
- It includes a range of processes to record, generate and manage the data [5.3.3, Figure 5.9, 5.4],
- It makes use of two different but related database applications, that is, Microsoft Outlook and Access [5.2, Figure 5.9].
- It uses two complementary sampling strategies [5.2], that is, purposeful sampling which contributes to coherence and emergent sampling which embraces randomness.

Chapter 6
Data analysis, interpretation and (re)presentation strategy

Chapter 6 is an element of Thread 1: Research methodology and design. It presents the strategy I created to analyse, interpret and (re)present the thesis.

Summary: In this chapter, I

- explain the notions and purposes of data analysis, interpretation and (re)presentation,
- explain the overall strategy in terms of its features, elements and processes,
- present a narrative that describes how the Visual Summary, a tool in the strategy, emerged.

6.1. Notion of data analysis, interpretation and (re)presentation

In the context of qualitative research, Coffey and Atkinson (1996) write that data analysis "means different things to different people" (p. 6). They describe definitions of data analysis by Huberman and Miles (1994), Dey (1993) and Wolcott (1994) and suggest that there are similarities and differences between these definitions. Despite these multiple meanings, Coffey and Atkinson (1996) stress that "data analysis deals with meaningful talk and action" (p. 5). Patton (2002) describes analysis as transforming data into findings or "making sense of massive amounts of data" (p. 432) into a description.

Both Coffey and Atkinson (1996) and Patton (2002) also assert that research involves more than analysing data to describe the data or create a story. They describe this as going beyond the data, while acknowledging that it is an inter-weaving and integral aspect of analysis. Coffey and Atkinson (1996) use the term "generalising" and "theorising" to go beyond the data to develop theory, adopting Dey's (1993, p. 51, as cited in Coffey & Atkinson, 1996) idea of a theory as "an idea about how other ideas can be related" (p. 140). Patton (2002) uses the term "interpretation" to describe the step of going beyond the data. He describes interpretation as

> "attaching significance to what was found, making sense of findings, offering explanations, drawing conclusions, extrapolating lessons, making inferences, drawing conclusions, and otherwise imposing order on an unruly but surely patterned world." (p. 480)

Describing the data is a form of representation of the data. According to Davis (2008), in complexity terms, representation and presentation of data occur simultaneously because of the partial nature of a research report and its role in the ever-evolving nature of knowledge creation. He writes that

> (i)n complexity terms, one cannot represent things as they are, simply because the representation contributes to the transformation of an always evolving reality." (p. 161)

He argues that creating a research report is simultaneously an act of representation and presentation; the former serves to call something to mind while the latter opens up new possibilities for interpreting what is written. I suggest that these acts also connote the act of re-presenting what has already been presented for a different audience, in a different way and/or for a different purpose.

Coffey and Atkinson (1996) and Patton (2002) suggest that analysis and interpretation are inter-weaving processes that are carried out throughout the research process and should not be viewed as a distinct phase separate from other research activities. I suggest that

presentation, representation and re-presentation are also embedded in, and therefore inseparable from, the processes of analysis and interpretation.

6.1.1. Data analysis

In this thesis, data analysis refers to the process of making sense of the data in terms of exploring the patterns, variations and drifts that emerged in the complex systems of knowers, knowledge and curriculum at different levels [2.3], where exploring means noticing, recognising and/or describing the patterns, variations and drifts. This notion of data analysis is consistent with the purposes of occasioning and describing emergence in the games of chase curriculum [1.1] and the understanding that emergence embodies patterns (or coherence), variations (or randomness and/or diversity) and structural drifts [Chapter 3].

There are two kinds of patterns I explored in data analysis, that is, narrative and descriptive patterns. I draw on Elliot (2005) to distinguish between a narrative pattern and a descriptive pattern; although both are forms of data descriptions that have the features of meaning and social context, a narrative pattern has the additional feature of chronology or a sequence of events. For example, in the teaching stories [Chapter 9], Table 9.1 counts as a descriptive pattern because it makes no reference to the sequence in which the strategies unfolded [9.2]. On the other hand, the following data descriptions count as narrative patterns because the element of chronology is present: (1) teaching patterns and variations in a game episode [9.7], and (2) teaching drifts in helping children to identify who are playing [9.8].

It is possible to have both patterns within the same data description, depending on the level(s) of analysis and timescale(s) associated with the analysis [2.4.2, 2.5.1]. For example, the Visual Summary [10.2] as a whole can be viewed as a narrative pattern which describes how the episodes unfolded over time. At the same time, the brief description of each episode in the Visual Summary counts as a descriptive pattern and the embedded analysis or data segment for an episode can either be descriptive or narrative in nature.

6.1.2. Interpretation

Interpretation refers to the process of attaching some significance or meaning to the pattern(s), variation(s) and drift(s) in the systems of knowers, knowledge and curriculum. Given the above assertion that analysis and interpretation are inter-weaving or coupled processes [6.1], interpretations can be and have been made (1) at any time during the thesis exploration and (2) about any pattern(s) that emerged at any level of the systems of knowers, knowledge and curriculum. The nature of the interpretation also depends on the purpose of

the data analysis [6.2]. Furthermore, in addition to the various ways of interpreting suggested by Coffey and Atkinson (1996) and Patton (2002), interpretation includes teacher thinking and action. The process of interpretation can be iterative, recursive or involve a combination of iteration and recursion [Coupled knowledge 3.1]. The iterative and/or recursive nature of interpretation enables, for example, the original meaning attached to a pattern to be elaborated on both in depth and in breadth.

Drawing on the notion of a theory as "an idea about how other ideas can be related" (Dey, 1993, p. 51) [6.1], I conceptualise theorising as a process of creating interpretive patterns or patterns of ideas. Interpretive patterns are patterns of meaning that emerge from narrative and descriptive patterns during all phases. However, the interpretive patterns that emerged during data analysis in and for curriculum [6.2] are embodied and/or embedded in the descriptive and narrative patterns created during the knowledge creating phase. Interpretive patterns that emerged during the knowledge creating phase are separated from the other two patterns and are articulated in 'Emerging knowledge' [9.9, 10.3, 11.3].

6.1.3. (Re)presentation

I use the term (re)presentation to acknowledge the simultaneity of data representation and presentation in this thesis. In representing the data, I frame the data in such a way as to call to mind certain patterns I recognise while acknowledging that it is possible to recognise other patterns in the data. At the same time, I present the data so as to open up other interpretive possibilities. For example, in the teaching, curriculum and learning stories [Chapters 9, 10 & 11], I call to mind patterns associated with the curriculum design and to prompt discussions related to the emergence of the local curriculum theory for games of chase and the concepts of local curriculum theory, curriculum design and curriculum dynamics in Chapter 12. Thus, (re)presentation embodies presentation, representation and re-presentation.

6.2. Purposes of data analysis, interpretation and (re)presentation

During the thesis exploration, I became aware of three different purposes for conducting data analysis, interpretation and (re)presentation; these are referred to as data analysis *for* curriculum, *in* curriculum and *of* curriculum.

Data analysis *for* curriculum is related to the purpose of creating a curriculum design for games of chase at the Centre. This process is related to the role of curriculum designer and took place across all three phases but in two slightly different ways. During the preparing phase, it involved making sense of my visits to the Centre in conjunction with research

literature to create an initial curriculum design. This initial design was intended as a guide for the teaching phase and was articulated in various forms and distributed across the various tools used to record the personal learning data [5.3.1]. During the teaching and knowledge creating phases, data analysis for curriculum involved using on-going data analysis to revise and refine the initial curriculum design and articulate the design that unfolded.

Data analysis *in* curriculum corresponds to data analysis during the teaching phase and is related to the role of a teacher and the purpose of making sense of the day-to-day curriculum we were living at the Centre in order to occasion emergence in games of chase. Interpretations were focused on teacher thinking and actions, and are embedded in descriptions of the data.

Data analysis *of* curriculum is related to the role of a researcher and involved making sense of the curriculum in order to describe emergence, understand the phenomenon and create the thesis report. While this was carried out predominantly during the knowledge creating phase, some aspects of data analysis of curriculum were also conducted during the teaching phase. During the teaching phase, it involved noticing, recognising and recording emerging and emergent patterns in the systems of knowledge, knowers and curriculum, which were then further investigated during the knowledge creating phase. During the latter phase, data was also analysed for other patterns that were not recognised during the teaching phase.

Although the three purposes and roles described above are different from each other, the distinction is not clear-cut in the sense that there are many occasions when they might be said to overlap. For example, data analysis *for* curriculum overlaps with data analysis *of* curriculum during the teaching and knowledge creating phases since creating a curriculum design is an integral part of creating the thesis report.

To summarise, data analysis, interpretation and (re)presentation were carried out for different but sometimes overlapping purposes. All were framed or constrained by the overall research purposes of occasioning and describing emergence in games of chase. In addition, analysis and interpretation can be considered as structurally coupled processes since the processes and outcomes of the analysis and interpretations mutually influenced each other within and across the three phases.

6.3. Overall strategy as doing bricolage

The overall strategy for data analysis, interpretation and (re)presentation involved making sense of the data at descriptive and interpretive levels and (re)presenting these in ways that were coherent and co-emergent with the conceptual framework [Chapter 2], the theory for emergence [Chapter 3] and the notion of an emergent methodology [1.4]. It involved a complex view of data analysis, interpretation and (re)presentation explained above to meet the same criteria used for collecting, generating and managing data [5.2], that is,

- Re-creating and re-presenting the curriculum related to games of chase and other emergent phenomena,
- Showing complicity of the different levels of curriculum and that of knowers and knowledge in the unfolding curriculum,
- Using data to generate curriculum and ideas or thinking about curriculum.

Such a strategy involved producing "thick analysis" that recognised the value of multiple analytic strategies and multiple investigations of the same data set (Coffey & Atkinson, 1996). It is consistent with the notion of doing bricolage that explores "traditional and contemporary research genres/methodologies and their analytical tools" (Kincheloe & Berry, 2004, p. 115) in the sense that it involved reflexive explorations to use and adapt tools from a range of traditional methodologies, for example, case studies, action research, ethonography and hermeneutics, with "contemporary analytical tools such as intertextuality, hypertext and multimedia" (p. 115).

6.4. Features of the strategy: Bricolage tools

The overall strategy has features which are consistent with the features of bricolage as conceptualised by Kincheloe (2001, 2005), Kincheloe and Berry (2004) and Berry (2006). This conceptualisation of bricolage is framed by the principles of complexity theory (Kincheloe & Berry, 2004), and is viewed as "a way of researching human activities, relationships and cultures" (Berry, 2006, p. 87) which is multimethodological, multitheoretical and focuses on webs of relationships instead of just the object of study (Kincheloe, 2005). The features of this overall strategy are conducting philosophical inquiries, developing conceptual tools, cultivating differences to occasion creativity in research, using multiple methods of inquiry and being sensitive to the contexts of research.

6.4.1. Conducting philosophical inquiries

Bricolage is concerned with "diverse theoretical and philosophical notions of the various elements encountered in the act of research" (Kincheloe, 2001, p. 679). Kincheloe discusses the importance of philosophical inquiries on these elements as part of bricolage in order to clarify our understandings of various discourses that frame notions of these elements. Kretchmar (2005) has this to say about the value of philosophy in the real-world context:

> "(P)hilosophy complements our understanding. Philosophy provides a unique perspective that is not concerned with empirical measurements. It also provides unique information such as descriptions of lived experience, logical distinctions, and speculations about what is good. Philosophic input is important if we want to honor common sense; avoid missing important information; and temper thinking that is reductionistic, looks for linear causation, and is based of causal relationships that run only in one direction." (pp. 16-17)

Some examples of philosophical inquiries carried out in this thesis included creating understandings of

- methodology and emergent methodology [1.4],
- the two meanings of data collection and generation [5.2],
- the notions and purposes of data analysis, interpretation and (re)presentation [6.1, 6.2].

6.4.2. Developing conceptual tools

Bricolage embraces both disciplinarity and inter-disciplinarity (Kincheloe, 2001) and is concerned with synerigising the tensions between depth and breadth in research. According to Kincheloe, research that embraces disciplinarity and inter-disciplinarity involves research at and across disciplinary boundaries, which he calls doing boundary work. Kincheloe's notion of synerigising disciplinarity and inter-disciplinarity resembles Davis and Sumara's (2006) idea of transdisciplinarity. This idea is also consistent with the complexity principle that emergence takes place at the edge of chaos [Coupled knowledge 3.2] which, in the case of knowledge, occurs at the boundaries of knowledge.

When doing boundary work, Kincheloe (2001) stresses the importance of developing conceptual tools. The conceptual tools that have been developed in this thesis to do boundary work in data analysis, interpretation and (re)presentation include, but are not limited to:

- the notion of thesis as exploration and report [1.5],
- the notion of phases [1.5.1],
- the concepts of local curriculum theory, curriculum design and curriculum dynamics [1.5.1, 1.5.3 &12.3],
- the conceptual framework as a structural view of curriculum [Chapter 2],

- the three types of patterns, that is, narrative patterns, descriptive patterns and interpretive patterns [6.5],
- the framework for playing games of chase as a content view of curriculum [Chapter 8],
- the three types of stories as (re)presentation, that is, teaching story, curriculum story and learning story [6.5, Chapters 9, 10 & 11].

6.4.3. Cultivating differences to occasion creativity in research

Bricolage involves the process of learning from differences in the sense of moving beyond tolerating difference to cultivating differences to occasion creativity in research (Kincheloe, 2001). This particular feature of bricolage is consistent with Kincheloe's (2001, 2005) assertion that bricolage is multimethodological, multitheoretical and uses multiple methods.

This notion of cultivating differences to occasion creativity in research is supported by the idea from complexity science that internal diversity is a source of creativity (Davis & Simmt, 2003). When there is diversity in terms of data collected, as well as analyses and interpretations generated, and when these are allowed to interact, new and sometimes surprising knowledge can be created, provided the other necessary conditions for emergence are present.

Examples of cultivating differences in this thesis included

- developing the various ways to collect and generate data in the RDMS [Chapter 5],
- conducting multiple investigations to create (1) a graphic reconstruction of the games of chase curriculum, (2) stories of emergence and (3) stories related to the teaching intentions [6.5],
- playing different games of chase and playing each game in a variety of ways [Chapter 9, Chapter 10].

6.4.4. Using multiple methods of inquiry

According to Kincheloe (2001), bricolage involves using multiple methods of inquiry. However, methods are not adopted from other methodologies but adapted in an active process of creating methods. This active process of methods creation involves (1) bringing together our knowledge of the research contexts with our previous knowledge with research methods, and (2) tinkering with the methods in the field-based and interpretive contexts (Kincheloe, 2005). Kincheloe describes the tinkering process as

> "a high-level cognition process involving construction and reconstruction, contextual diagnosis, negotiation and readjustment. Researchers' interactions with the objects of their inquiries are ... always complicated, mercurial, unpredictable and, of course, complex." (p. 324)

Tinkering with and adapting existing methods involves identifying "the availability of new technologies and structures in addition to new ways of using traditional research tools" (Berry, 2006, p. 104). This discussion suggests that research methodology can be an active process of constructing and negotiating methods with a focus on knowing what tools are available, how to use them in traditional ways and how they can be used in new ways. However, in the context of Clough and Nutbrown's (2002) notion of methodology as "the painstaking justification we offer for the decisions we have made" (p. 28) [1.4], it also means justifying the construction of these methods. This argument is consistent with Kincheloe's (2005) assertion that we need to defend "what we assert we know and the process by which we know it" (p. 325).

The process of tinkering with and adapting methods in research suggests that doing bricolage resembles doing action research in the sense that it involves research *in* action, research *of* action and research *for* action (Sagor, 2005).

Examples that illustrate the multiple methods of inquiry used in this thesis include:

- the Research Data Management System and its multiple tools for collecting, generating and managing data [Chapter 5],
- Creating different types and forms of stories in data analysis of curriculum [6.5]

6.4.5. Being sensitive to the contexts of research

Briocolage is sensitive to the contexts of research (Kincheloe, 2001), in the sense that it "brings an understanding of social theory together with an appreciation of the demands of particular contexts" (p. 688). I interpret this to mean that when using and developing theory in research, we should carefully consider the various contexts in which the research is situated. These various contexts can be viewed as local conditions (Fullan, 1999) and can include the day-to-day realities in teaching and university contexts, as well as the values and positions of various people involved in the research. In other words, in addition to tinkering with methods, bricolage involves a process of tinkering with theories in ways that involves phenomenology.

In this thesis, sensitivity to the context of research is visible in

- the discussion of the Centre context that contributed towards conditions for emergence [4.3],

- the teaching strategies [9.2],
- the assumptions about the nature of preschool children and their participation in games of chase [8.1.1].

6.5. Elements in the strategy

Figure 6.1 shows the elements in the data analysis, interpretation and (re)presentation strategy.

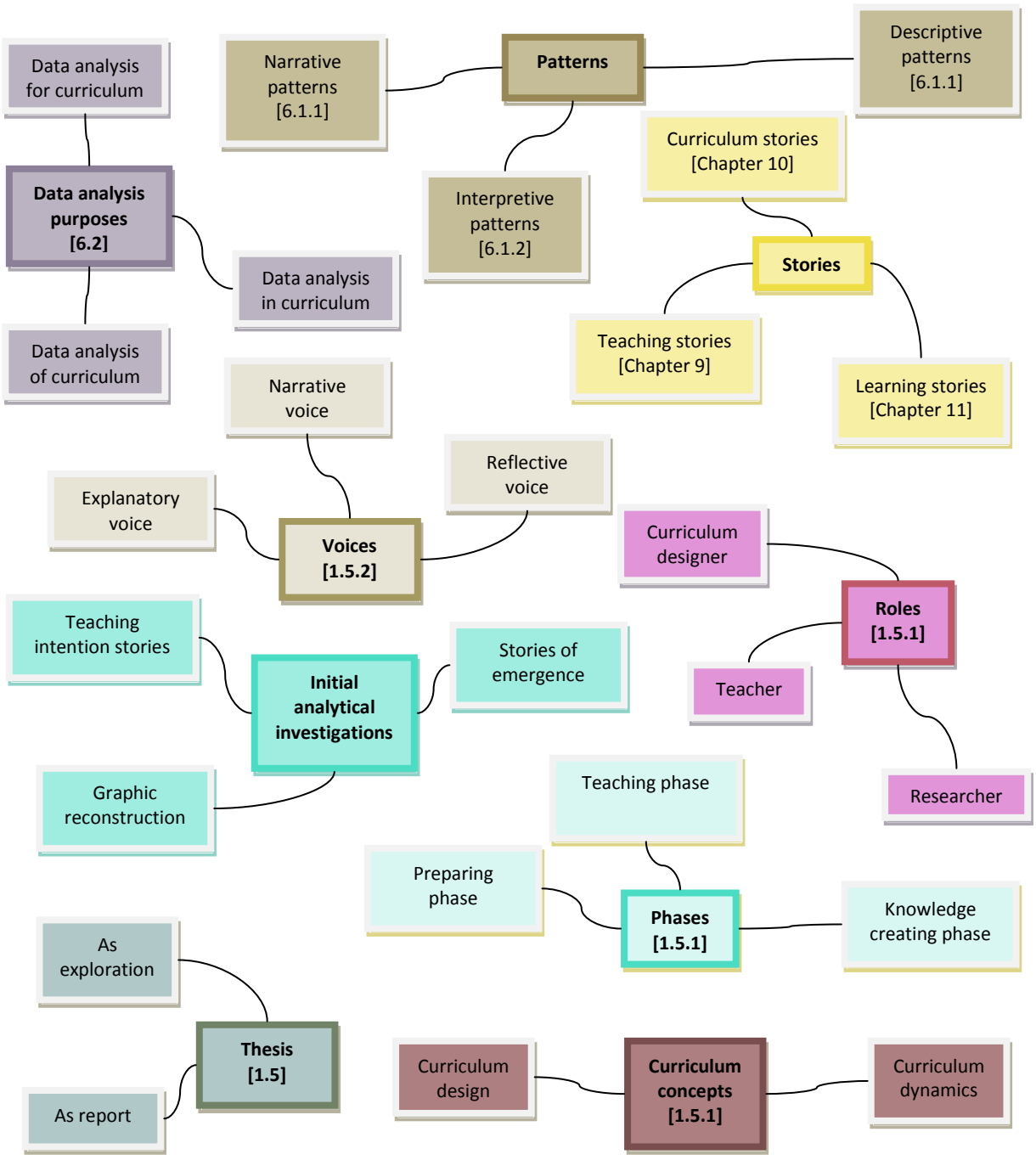


Figure 6.1: Elements in the strategy for data analysis, interpretation and (re)presentation

The strategy includes the conceptual tools, philosophical tools and tools to cultivate differences to occasion creativity in research. The elements are: (1) data analysis purposes, (2) patterns, (3) voices, (4) stories, (5) initial analytical investigations, (6) roles, (7) thesis, (8) phases, (9) curriculum concepts. The relationships between the elements are described below.

The data analysis presented in this thesis report pertains to data analysis *of* curriculum carried out during the knowledge creating phase. However, it embodies and embeds any data analysis and/or interpretations *for* and *in* curriculum that took place during the teaching and preparing phases [6.2]. At the same time, this data analysis of curriculum is coupled with the wider purpose of describing emergence in games of chase.

The process of data analysis and interpretation involved exploring patterns in the data. I explored three types of patterns, that is, narrative patterns [6.1.1], descriptive patterns [6.1.1] and interpretive patterns [6.1.2]. I have articulated these patterns in the thesis report using a combination of voices, that is, explanatory, narrative and reflective voices. The use of multiple voices in the writing is part of the thesis report strategy to understand and (re)present the thesis exploration as authentically as possible [1.5.2].

The narrative and descriptive patterns presented in the thesis report are organised into three types of stories, that is, teaching stories, curriculum stories and learning stories. Each type of story represents a particular perspective of the knower-knowledge-curriculum coupling that is used as an analytical framework as well as a facet of curriculum design. Specific details of the nature of the teaching, curriculum and learning stories are explained in Chapters 9, 10 and 11 respectively.

The stories presented represent a particular state of the thesis exploration at a particular point in time [1.5]. As outcomes, the stories emerged from the structural coupling of all data analysis-related tasks or activities that began as three different and fuzzy analytical investigations. The investigations were (1) creating a graphic reconstruction of activities during teaching phase, (2) creating stories of emergence in games of chase, (3) creating stories related to teaching intentions.

These analytical investigations began as separate investigations and were fuzzy in the sense that they began as hunches of what was possible to investigate in my interactions with the mass of data. The hunches eventually gave rise to more coherent patterns which, in turn, continued to evolve into the stories. The transformation of hunches to coherent patterns to

stories occurred through structural coupling and is illustrated in the story *Drifts towards a digital and embedded Visual Summary* [6.7].

6.6. Key processes in the strategy

I became aware of two key processes in the strategy which I refer to as "thinking drifts" and "self-organisation in thinking", which exist in a coupled relationship with each other. I use thinking in the sense of Maturana and Varela's (1998) cognition to mean knowing where "every act of knowing brings forth a world" (p. 25) and "all doing is knowing and all knowing is doing" (p. 25). It includes all manner of thinking, doing and knowing that were used intentionally and unintentionally in data analysis, interpretation and (re)presentation and is consistent with the complex nature of knowledge [Coupled knowledge 2.1].

The process of thinking drift calls upon the various methods in my personal learning data sub-system [5.1.1, 5.3.1], including writing for learning, scribbles for thinking and maps for learning, to generate analyses, interpretations and (re)presentations. The outcomes of this process are gradual shifts in thinking, ideas and insights that are more or less organised as well as an eventual feeling of 'being stuck'. This feeling is a signal that my thinking is approaching the edge of chaos [Coupled knowledge 3.2]; it is time for me to do something else and let these ideas self-organise among themselves and with other ideas that emerge from that 'something else' I am doing. After some time, the result of this process of self-organisation shows itself as the emergence of something, for example, an idea, a concept, a chapter, that I recognise as what I have been looking for.

The journal entry below describes an instance of how I used this strategy:

> "This morning, I finally sorted out an explanation for my theory of emergence in a way that satisfied me. I began writing this chapter for my thesis a month ago and after two weeks, although I made considerable progress with it, I felt stymied by a sense that something wasn't quite right with my understanding of this theory coupled with a sense that my lack of understanding arose from some 'missing pieces'. But I didn't know what it was that wasn't right or was missing. So I put this writing on hold and went on to work on the teaching and curriculum stories in the hope that something would emerge from these that could help me to finish writing this incomplete chapter.
>
> While writing my teaching and curriculum stories, I used the concepts of structural drift and self-organisation to develop the idea of drifts and self-organisation as processes in teaching and learning. Then, two days ago, after two weeks of writing the teaching and curriculum stories, I received confirmation that the symposium presentation that Elaine, Chris, Lindsey and I had submitted proposals for had been accepted for this year's NZARE conference. We had submitted a proposal to present complexity research from our university involving different projects with instances of emergence. The reviewers' feedback had suggested revisions to our abstracts, including a theory of emergence in the cover paper.
>
> Last night, I began scribbling and mulling over how I could represent a theory for emergence as a diagram to simplify the explanation without losing sight of its complexity. This morning, I completed that

> diagrammatic explanation as a Word document and I believe this will be useful for both the symposium and my thesis. Before last night, never in my wildest dream had I imagined it was possible to 'draw' this explanation." (OJ100807 – 1015 – Drifts and self-organisation in analysis and interpretation)

This strategy of coupling thinking drifts and self-organisation bears a striking resemblance to Dewey's (1998) notion of absorption and incubation:

> "It is common experience that after prolonged preoccupation with an intellectual topic, the mind ceases to function readily. It apparently has got into a rut; the 'wheels go around' in the head, but they do not turn out any fresh grist. New suggestions cease to occur. The mind is, as the apt expression goes, 'fed up'. This condition is a warning to turn, as far as conscious attention and reflection are concerned, to something else. Then after the mind has ceased to be intent on the problem, and consciousness has relaxed its strain, a period of incubation sets in. Material rearranges itself; facts and principles fall into place; what was confused becomes bright and clear; the mixed-up becomes orderly, often to such an extent that the problem is essentially solved." (p. 284)

6.7. Drifts towards a digital and embedded Visual Summary

This section is a narrative account that describes the emergence of a digital and embedded Visual Summary [10.1]. The narrative describes four phases in data analysis which gave rise to this emergence. The purpose of describing this narrative is to illustrate (1) one of the ways in which the strategy unfolded during the course of the thesis exploration, and (2) the non-linear and structurally-coupled nature of data analysis.

To create this narrative account, I analysed the personal learning data from the Outlook journal databases between March 2009 and October 2010 to (1) identify data relevant to analysis-related tasks I engaged in, (2) group the analysis-related data into inductively-derived phases which adequately summarised what I was doing, and (3) select specific entries of ideas, events or reflections that provided evidence for and/or illuminated the phases.

6.7.1. Phase 1: Tinkering with methods of organising and managing data

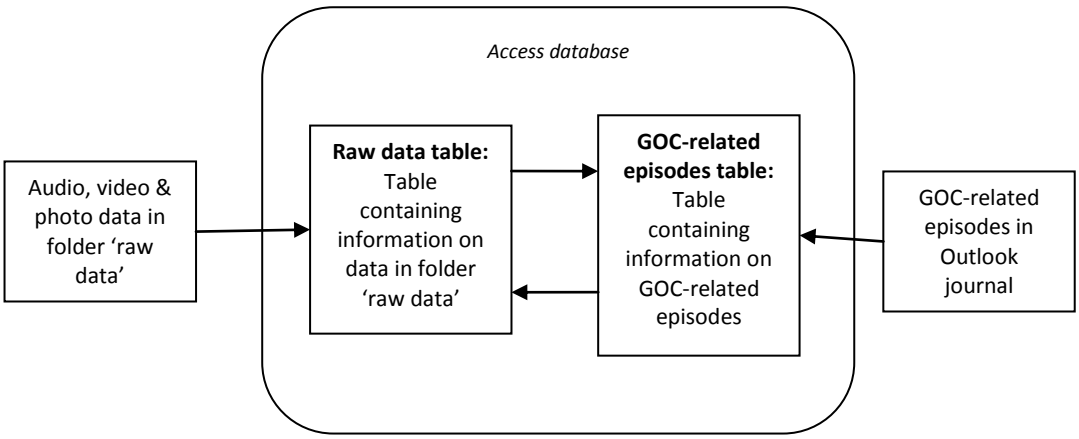
I began the data analysis of the teaching data in March 2009 by tinkering with the processes of data management. By tinkering, I mean trying out different ways of organising and managing the data collected and generated with the aim of eventually selecting the ones that worked [6.4.4]; one of the ways I tinkered with was to create a timeline of the running games and tag that the children and I were playing. I wrote about this tinkering in a journal entry:

> I have spent the past three days trying to get a feel for the audio, video and photo data I have collected so far, all 890 of them. Although I do look and/or listen to the data each day after I download them from their respective devices, I find that the daily looking and listening is like studying the trees while walking in a woods that I don't know much about. After eight weeks of walking, it's easy to get lost in the woods if I only concentrate on closely studying the trees! I needed to have a good look at the trees from afar to hopefully get a feel for the woods I'm in.

Let me call my data the 'trees. I've stored them all in a folder I call 'raw data', labelled them in a way that I can recognise and ordered them according to the date they were collected. But I needed to link them with the different games of chase (GOC)-related episodes that I have observed and/or played with the children so far to get a better sense of where I've been. I have recorded the information pertaining to GOC-related episodes in my summary fieldnotes.

So how did I link them? When I started out three days ago, I didn't actually know how to do it or what to use, but I did have a hunch that one or more of the Microsoft Office 2007 softwares I had would do the job. I started by listing down the GOC-related episodes on Outlook calendar to create a big picture view of the episodes across the seven weeks. But it didn't help me to see a big picture view of how each episode links with the data in my 'raw data' folder, and I couldn't find a way within Outlook to do this.

So I went to Access to create a table of the GOC-related episodes. I am relatively new to Access and don't know it well. I first used it last year and have tinkered with it on several occasions since then. But I believe that that tinkering, together with some tacit knowledge of database principles gained in a previous life as a software engineering student, proved valuable because I was able to do more than just create this table. I managed to create another table containing information on the data in the 'raw data' folder and learnt to use the relationship feature of Access to link the two tables together so that I could tell quickly which audio, video or photo files were relevant to each GOC-related episode and vice-versa. I guess what I have done was to create a tool for summarising and linking my data and the diagram below may help to illustrate this better.



I now have a better grasp, though not a thorough knowledge, of Access and the process of creating the above tool also gave me further ideas on other tables that I could create, building on what I already have. What I have done might perhaps be counted as part of phase two of Baptiste's (2001) qualitative data analysis. According to Baptiste, phase two involves classifying data and includes tagging the data and grouping the tagged data. In my case, I tag the data as part of my methods for collecting data each day [5.4], and what I have done here can perhaps be seen as grouping my tagged data to facilitate phase three of data analysis, that is, constructing stories and theories. I think tacitly I knew this was what I had set out to do, but didn't know how. These three days have been a journey of discovering how.

(OJ090311 – 1351 – Playing with analysis)

6.7.2. Phase 2: Drift towards a paper-based graphic reconstruction

In April 2009, I decided to create a graphic reconstruction of the data related to the episodes the children and I had played so far. The idea of using a graphic reconstruction came from my master's thesis (Hussain, 2007); I had used graphic reconstruction as a form of data

display and as a tool for interpreting the relationships among events, ideas, actions and local conditions in an explanatory theory of change. In this thesis, I thought about creating the graphic reconstruction in the form of a timeline that could create 'a big picture' view of the games the children and I played. From tinkering with the timeline of the running and tag games, I sensed the possibility of creating a timeline of the episodes over the fourteen weeks at the Centre, which I later referred to as analysis of the system of curriculum at activity level. In late May 2009, about a month after I left the Centre, I created the first version of this timeline on a large piece of paper and revised it several times.

6.7.3. Phase 3: Drift towards a digital graphic reconstruction

Four weeks later, I had a spontaneous idea to use Excel to create a digital version of the graphic reconstruction. I tested out the idea and when I discovered that it was workable, I abandoned the paper-based graphic reconstruction and continued working on the digital version.

It was also around this time that I began engaging in what I later called analysis of the system of curriculum at episode level. This involved two other investigations of the same data set [6.3, 6.5]: (1) analyzing videos of various episodes to identify emergence in and across the episodes and write stories about them, and (2) analyzing the data to create stories related to the teaching intentions [8.1]. These investigations involved creating timelines to analyse the episodes and these two facets of data analysis co-emerged with a revision of the nested system of curriculum in the conceptual framework [Chapter 2]. The revised version included the levels below the episode level, that is, the segment and inter-action levels, which were not present in the initial version.

6.7.4. Phase 4: Drift towards an embedded visual summary

The graphic reconstruction was a useful tool for writing the stories because it provided a visual summary of the episodes that unfolded over the fourteen weeks and enabled me to organise the episodes both chronologically and in terms of activities. I eventually decided to call it a Visual Summary.

However, the Visual Summary I had so far did not reveal details related to an episode, for example, summarising the episode or highlighting some facet of the episode that was important. In other words, the Visual Summary only presented the relationships in the system of curriculum without any reference to the coupled systems of knowers and knowledge. I considered this to be a limitation in the Visual Summary as a data display or

(re)presentation tool. To address this limitation, I wondered about the possibility of embedding some aspects of analyses at segment and/or inter-action levels in the Visual Summary that could show complicity of the systems of knowers and knowledge. The revised conceptual framework [Figure 2.1] meant that this was a conceptually justifiable possibility but I did not know how to make the embedding work in Excel. In December 2009, I stumbled upon the screentip and hyperlink functions in the software which enabled me to summarise each episode and embed details into the episode. I decided to embed details in the form of videos, photos and texts in the episodes of the Visual Summary. This decision enabled me to show how knowers, knowledge and activities co-emerged with each other over the duration of the teaching phase.

The Visual Summary is found on the DVD at the back cover of the thesis, its features are explained in more detail in Chapter 10 [10.2] and its specifications are described in Appendix D. Discussions related to the Visual Summary are found in Chapter 12 [12.2] and Chapter 13 [13.2].

Chapter 7
Ethical considerations and issues

Chapter 7 is an element of Thread 1: Research methodology and design. It presents the overall strategy for dealing with ethical issues.

Summary: In this chapter, I

- explain the overall strategy,
- identify and discuss three key ethical issues in the thesis exploration: (1) doing research with very young children, (2) dealing with possible inappropriate behaviours, and (3) the tension between the collaborative nature of early childhood education and confidentiality in research.

7.1. Overall strategy for dealing with ethical issues

The dual purposes of this thesis, that is, occasioning emergence and describing it, embodied the intention to make two forms of contributions. The first was to contribute to life at the Centre as a teacher during the teaching phase, and the second to contribute to knowledge about curriculum-related phenomena in the form of a thesis and other research publications. The former intention was designed to serve the interests of the Centre community while the latter my own interest and that of the teaching and research communities. A juxtaposition of different purposes to serve multiple interests could give rise to ethical tensions and issues (Christensen & Prout, 2002).

In addition, the emergent research methodology I used [1.4] meant that although the research purposes were clear, there were many other facets that were initially uncertain and only became clearer as the thesis exploration unfolded. The following facets of the thesis allude to this uncertainty and emergent clarity: (1) the emergent nature of the Research Data Management System [5.2], (2) the emergent patterns and variations in collecting teaching data [5.4], (3) the emergent nature of the analytical investigations [6.5] and (4) the emergence of the Visual Summary [6.7]. This uncertainty is consistent with the nature of a complex reality which is characterised by multiple couplings that can affect researchers and participants in many visible and/or invisible ways [1.3]. This uncertainty is also consistent with the complexivist understanding that outcomes of emergence cannot be fully anticipated in advance [3.6.1]. Given that complexity thinking foregrounds ethical responsibility and reflexivity [1.3], this raises the question of how, as a researcher, I could ensure that these outcomes were ethical and meaningful for the individual agents and the collective system.

To address the uncertainty as well as any ethical tensions and issues, I developed an overall strategy which consists of two loosely coupled elements in the sense that they are both consistent with the features of complexity thinking [1.3]. The two elements are a focus on value creation (Wenger et al., 2002) and a focus on critical reasoning (Traer, 2009). They form the bases of ethical decisions and actions in my thesis exploration with the former focusing on expanding possibilities in terms of creating multiple values and the latter on ensuring that the possibilities are ethical and meaningful at individual and collective levels. Both elements embody a consciousness of possible and existing couplings in the thesis exploration.

7.1.1. A focus on value creation

Wenger et al. (2002) use the idea of value creation as a means of embracing diversity of interests, motivation, knowledge and participation in a community of practice. Communities of practice exist in organisations such as educational institutions. The Centre can be seen as a community of practice because it has the three coupled elements that characterise such a community, that is, a domain of knowledge, a practice and a community. Facets of the elements are visible in the description of the Centre context [4.2]. By embracing the diversity, it is possible for the community to sustain itself in ways that benefit individual members as well as the organisation that the community is a part of. Wenger et al. (2002) suggest that a focus on value creation means creating multiple types of value for members and the organisation in complex ways. These values can be (1) short-term and/or long-term, (2) tangible and/or intangible, (3) strategy implementing and/or strategy-making.

In the thesis exploration, a focus on value creation meant enabling children, teachers and me to participate in ways that were meaningful to us individually as well as to groups and the Centre community as a whole. This idea of value creation is consistent with Fullan's (1999) synergy or fusion political, moral and intellectual forces of change to bring about change. In my master's thesis (Hussain, 2007), I used Fullan's (1999) idea as the basis for bringing about change in ways that are ethical and beneficial to individuals, groups and organisations and found that both value creation and fusion of change forces focus on being creative in ethical ways.

7.1.2. A focus on critical reasoning

According to Traer (2009), critical reasoning involves identifying self-interest and unmasking rationalisations in our decisions and actions. It is underpinned by (1) an understanding of ethics that is concerned with making sense of our intuitions in terms of what is right and good, and (2) the assumption that feelings and reasoning are complicit aspects of our decisions and actions. This notion of critical reasoning is consistent with Davis and Sumara's (2006) assertion that

> "(t)he complexity researcher has an obligation – an ethical imperative… - to be attentive to how she or he is implicated in the phenomenon studied." (p. 169)

Traer's (2009) notion of reasoning distinguishes it from rationalisation. The latter involves providing rational and creditable motives for our actions without analyzing our true or unconscious motives whereas the former involves reflecting on both reasons and feelings.

Traer argues that while using reasons can help us to explain our decisions as well as guard against biases, a sense of inadequacy and a focus on winning an argument, considering our feelings ensures that our reasoning embodies empathy and is both moral and humane.

Kretchmar (2005) and Traer (2009) identify three ways of reasoning although they describe them differently. According to Kretchmar (2005), these are inductive reasoning, intuitive reasoning and deductive reasoning. Traer (2009) describes them as creating inductive meaning, deductive reasoning, and reasoning by analogy. The first involves providing evidence to support an idea, the second can involve applying a principle to or drawing an inference from a particular situation while the third means explaining a phenomenon by comparing it with something else that is similar and yet slightly different. In this thesis, I engaged in combinations of all three ways of reasoning in justifying the decisions and actions I took. For example, these ways are visible in different parts of the discussions of the ethical issues below.

7.2. Ethical issues in the thesis exploration

7.2.1. Doing research with very young children

In recent years, there has been some debate around the ethics of researching with children in the light of recent reconceptualisation of children and childhood (Christensen & Prout, 2002; Danby & Farrell, 2004; Graue & Walsh, 1998). Christensen and Prout (2002) argue that our ethical relationships and practices with children stem from our beliefs around the nature of children and childhood.

I adopt Christensen and Prout's view that children are social actors and participants in life at the Centre, and hence in this research. This view implies that

> "the practices employed in the research have to be in line with children's experiences, interests, values and everyday routines. As a researcher one has to be aware of, and in practice engage with, the local cultures of communication among children paying attention to the social actions of children, their use of language and the meanings they put into words, notions and actions (Christensen, 1999: 76-7). This entails that the researcher establish a dialogue through which it becomes possible to create a better understanding of the social interactions and relations that children are part of (Christensen & James, 2000)." (pp. 482-483)

This means that, although formal and written consent for children to participate in this research were sought from children's caregivers in line with normal research practice [7.2.3], I also engaged in regular and on-going dialogues and negotiations with children about my research and their participation in it. Engaging in on-going dialogue and negotiation during teaching served as a means of (1) maintaining on-going ethical relationships with children,

and (2) giving children the opportunity to participate in the research at different levels and in different forms of participation at different points in time. On-going dialogue and negotiation were visible in the following facets of curriculum dynamics: (1) children were allowed to choose when to participate and leave an episode [9.7], (2) children were encouraged to contribute to the way(s) we played an episode [9.7], (3) children contributed to the emergence of the game, *Big A, Little A*. [10.3, 11.2, 11.3].

However, engaging in on-going dialogue and negotiation is different from attempting to ensure that participants are adequately informed of the research and consent to participate in it. Eisner (1998) problematises this issue of informed consent:

> "(T)he notion of informed consent implies that the researchers are able to anticipate the events that will emerge in the field about which those to be observed are to be informed. This is hardly a characteristic feature of field research. Researchers do not usually know what will emerge, except perhaps general themes, and therefore are not in a good position to inform those to be observed what to expect." (p. 215)

Furthermore, the issue is compounded when researching with young children who are not likely to have the same understanding of the research project and the ethical issues as the researchers who have spent "long periods of time wrestling with ethical issues" (Lee & van den Berg, 2003, p. 99).

Upon reflection, I realise that my on-going dialogues and negotiations with children focused mainly on the purpose of occasioning emergence during the teaching phase, which is consistent with my practice of sharing the enacted games of chase curriculum at the Centre [9.6]. I did not focus much on explaining to children how I was going to use the data after I left the Centre although I did mention in my letter to the children that I was going to write stories about what we did together and share these with others [Appendix C].

There were two difficulties with regards to explaining to children what I was going to do with the data during the knowledge-creating phase. Firstly, I do not assume that children understood what I meant in the letter. There is very little evidence to suggest that children could distinguish between my teacher-role during the teaching phase and my researcher-role beyond this phase, especially since many had known me as a teacher and that many of the practices I undertook during the teaching phase were consistent with the teaching practices at the Centre.

Secondly, given the emergent nature of the thesis exploration, I was not clear during the teaching phase as to what I was actually going to do with the data I collected and hence could not articulate it to the children; this only emerged with sufficient clarity after I left the Centre.

7.2.2. Dealing with possible inappropriate behaviours

The view of curriculum as content suggests that it is possible for children to engage in behaviours that can be deemed inappropriate when playing games of chase [Chapter 8], bearing in mind that what counts as appropriate and inappropriate are socially constructed and can be different in different settings (such as home settings and early childhood settings). One of the factors that can give rise to these outcomes is the level of excitement and social interaction present during these games. To pre-empt and deal with inappropriate behaviours, I included the following strategies:

- Creating an enabling constraint in the form of the framework for playing games of chase [Chapter 8] that would simultaneously give teachers and children the freedom to be creative and minimise the occurrence of inappropriate behaviours.
- Creating and maintaining good communications and relationships with teachers, parents, children and management [Table 9.1, 9.6].
- Knowing and being consistent with the Centre's behaviour guidance policy.
- Using a credit model of assessment (Carr, 2001; Ministry of Education, 2004) by viewing inappropriate behaviours as opportunities for further learning, and facilitating further activities that can provide for such learning [VS: CH7].
- Using Gump and Sutton-Smith's (1971) suggestion of manipulating game factors so that children can benefit from games of chase [8.1.2, 9.5].
- Using various ways to teach what counts as appropriate and inappropriate ways of playing tag. Some of the ways include storytelling, drawing, magnet board stories as well as watching and discussing videos of appropriate and inappropriate ways of playing.
- Using ICT as a means of capturing, sharing, dialoguing and discussing ideas and issues that arise during play [Attachment, Table 9.3].

7.2.3. Tension between the collaborative nature of early childhood education and confidentiality in research

The underpinning principles of empowerment, holistic development, family and community and relationships in Te Whāriki (Ministry of Education, 1996) [Coupled knowledge 4.1] carry the connotation that teaching and learning at an early childhood centre are collaborative activities. In practice, collaboration can mean sharing of stories, pictures, photos and videos among teachers, parents, children and management for the purposes of teaching and learning. This, however, implies a tension with the normal research practice of ensuring confidentiality

of data, and hence, of participants' identities. In other words, the inter-twining of teaching-related and research-related purposes carries with it an ethical tension that needed to be resolved.

The Centre has a policy for maintaining confidentiality in relation to the children's learning journal, photographs and stories. I used their policy in my role as a teacher during the teaching phase to guide my teaching-related actions and decisions. I also allowed parents and teachers to choose different forms and categories of consent. They could choose to allow me to collect and use stories, photos, videos or audiorecordings for sharing *within* the Centre community as well as to choose to give me permission to use any of these for my thesis and any publications *outside* the Centre community. In addition, I used the strategies below to guide my actions and decisions during data analysis of curriculum [Chapter 6]. All the above strategies are reflected in the information letters and consent forms to parents and teachers at the Centre [Appendix C] and have been approved by the University of Canterbury.

- I used fictitious names for all children, parents, teachers and management in research-related publications outside the Centre community.
- Participants (children, parents and teachers) were able withdraw from the research at any time.
- Participants could withdraw any information (including photographs and video) about themselves and/or their children at any time.
- I promised to use all data collected and generated only for educational purposes.

Given the emergent nature of the thesis exploration, I also adopted a strategy of sharing curriculum and research with the Centre community. This strategy is articulated in Chapter 9 [9.6] and is consistent with Davis and Sumara's (2006) assertion that complexity research must "give primacy to relationship and rely on communication" (p. 170).

Chapter 8
Curriculum as content: Framework for playing games of chase

Chapter 8 is an element of Thread 2: Curriculum design. It presents a content view of curriculum in the form of a framework for playing games of chase.

Summary: In this chapter, I

- explain the framework including its purpose, elements and pedagogical assumptions,
- identify facets of curriculum as structure and process that are embedded and embodied in the framework,
- argue that the framework can be used to evaluate the enactment of a games of chase curriculum.

8.1. The framework as a system of knowledge

The framework for playing games of chase is a system of knowledge or an ideational system [2.3] intended to provide coherence for the games of chase curriculum. It consists of two knowledge threads which allude to what counts as valued knowledge in this framework. Figure 8.1 summarises the framework in a diagrammatic form.

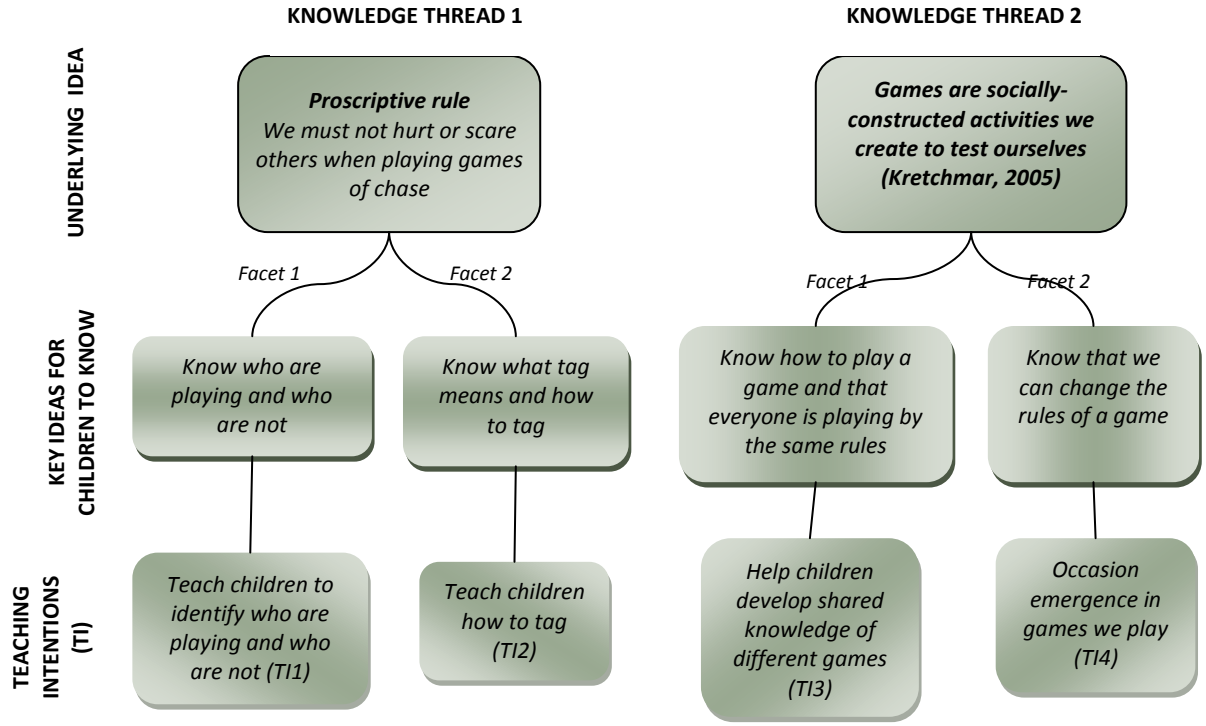


Figure 8.1: Framework for playing games of chase

Knowledge thread 1 focuses on the social aspect of games of chase by alluding to the value of playing games of chase in socially acceptable ways. Knowledge thread 2 focuses on developing an understanding of games of chase that resonates with the experiences of preschool children by valuing both the structure and flexibility in games. Each knowledge thread consists of two facets with an underlying idea, ideas children should know and related teaching intentions, TI1 to TI4, that teachers can focus on in their teaching.

8.1.1. Knowledge thread 1

Knowledge thread 1 focuses on developing shared knowledge, viewed as redundancy in knowledge [3.4], which can prompt games of chase to unfold in ways that are socially acceptable. It does this by identifying what counts as unacceptable outcomes in games of

chase and by addressing what children and teachers need to know in order to minimise the unintentional emergence of these outcomes.

This framework identifies scaring and/or hurting others while playing as the unacceptable outcome in games of chase. It is an outcome I have observed among children in early childhood settings and is related to two key issues in games of chase at school, that is, aggression (Chandler, 2008) and safety and injury (Chandler, 2008; Henry, 2001; Lipton, 2003).

The proscriptive rule that we should not scare or hurt others when playing games of chase emerges from the above unacceptable outcome. The rule clarifies what counts as the non-negotiable bottom-line in games of chase. According to Davis and Sumara (2006), a proscriptive rule is different from a prescriptive rule; the former identifies what is unacceptable while the latter dictates what is acceptable. They argue that a proscriptive rule in a system is useful when the focus is for the system to remain viable. On the other hand, a prescriptive rule is useful when the focus is for the system to survive. Thus, the use of proscriptive rule in this framework is suitable because the focus is on maintaining the viability of games of chase in the curriculum. This rule also implies that other outcomes are potentially acceptable.

However, as I have observed from experience, it is possible for pre-school children to unintentionally hurt or scare others and it is important to make a distinction between intentional and unintentional acts. This distinction is important because teachers can address them differently, although there may be some difficulty identifying children's intention in relation to young children who may have limited verbal communication skills.

There are two common scenarios in which children can unintentionally hurt or scare others while playing tag at an early childhood centre. The first involves a child chasing another child who is not playing. This can happen in an early childhood setting where groups of children often engage in different activities in the same shared outside space. In such a setting, a chaser may not be able to clearly identify who are and are not playing. Learning to identify who are and are not playing is important knowledge for a child if he/she is to play without unintentionally hurting or scaring others; hence the need to find strategies to help children learn this.

The second scenario involves a child hitting someone, thinking that he/she is tagging that person. This is a situation that can easily arise if a child does not know the difference

between tagging and hitting someone. It suggests that it is important for children to learn what tag means and how to tag in a game.

Therefore, in this knowledge thread, the key ideas for children to know can be described as important knowledge that children should know to avoid situations where they unintentionally hurt or scare others. To support children's learning of these ideas, teachers need to design the games curriculum to incorporate the proscriptive rule and the associated teaching intentions.

8.1.2. Knowledge thread 2

Knowledge thread 2 focuses on helping children learn the nature of games from their game experiences. It does this by introducing children to the tension that games have rule which players agree to abide by, and that players can agree to change the rules of the games. This knowledge thread also implies that teachers can work with the tension to help children learn these features of games.

According to Kretchmar (2005), games are activities we create to test ourselves and are not natural problems we solve in the course of our daily lives. As socially-constructed activities, they require rules that (1) define the game, (2) specify the start and end of a game, (3) specify what happens when a rule is violated or an unexpected event happens, and (4) specify how we test ourselves and/or compete with others in the game.

The first facet of this knowledge thread addresses an understanding of games relevant to preschool children. Here, it is important to make a distinction between sport, games and play. In sports, the rules and procedures are more standardised and strictly adhered to (Graham, Holt/Hale, & Parker, 1998), while those in games can be varied and flexible, as evidenced by the variety of ways in which we can play tag. However, for preschool children, playing a game can sometimes count more as play than a game if it is characterised by "an encounter with possibilities" (Esposito, 1995, p. 116) or constant negotiation of the rules over the course of play.

The ambiguous nature of games in relation to preschool children suggests that for a group of children to successfully play a game and enjoy it, players need to know how to play a particular game and also know that everyone is playing by the same rules. In other words, there needs to be some shared knowledge of a game and its rules among players. A teacher can help children to develop shared knowledge of various games by allowing children to

experience different games and at the same time develop shared understandings of these games.

The need for shared knowledge of a game does not necessarily preclude the possibility of negotiating changes to the rules as the game unfolds. The second facet of this knowledge thread addresses this possibility by suggesting a relationship between children knowing that they can change the rules of a game and teachers focusing on occasioning emergence in games. Here, occasioning emergence refers to the co-creation of a new game from existing ones. This idea of occasioning the emergence of a new game resembles the idea of game metamorphosis (Morris & Stiehl, 1999) where a "game is completely transformed to a completely different one" (p. 47).

8.2. Embedded and embodied facets of curriculum as structure and process

8.2.1. Knower-knowledge couplings

The knowledge articulated in the framework for playing represents knowledge at the level of the individual and is framed in the context of knower-knowledge couplings [2.3]. Teaching intentions refer to teacher's knowledge, ideas children should know to children's knowledge and the underlying ideas to both teacher's and children's knowledge. Davis and Sumara (2006) refer to such a coupling as the simultaneity of knower and knowledge.

8.2.2. The framework as an enabling constraint

The two knowledge threads are loosely-coupled in the sense that they are simultaneously independent of each other and responsive to each other. They are independent because they address different concerns, that is, each serves a different purpose. At the same time, their purposes are coupled; knowledge thread 2 serves the purpose of opening up possibilities while knowledge thread 1 serves the purpose of constraining the possibilities. Both are necessary conditions to successfully enact the games of chase curriculum.

Taken together, the knowledge threads define an enabling constraint, (Davis & Sumara, 2006), that is, a structure that is constrained by process, procedures or limits, yet is flexible enough to enable creativity within its boundaries [3.5]. The constraining feature of the boundaries is afforded by knowledge thread 1 while its flexibility feature by knowledge thread 2; the implication is that teachers and children can enact the games of chase

curriculum in many possible ways as long as it does not involve breaking the proscriptive rule.

8.3. The framework as a criterion for evaluating the enacted curriculum

The two knowledge threads articulate two different criteria for evaluating what counts as success in occasioning emergence in games of chase. Knowledge thread 2 supports the research purpose of occasioning emergence without putting a restriction on what emergent phenomena can be occasioned. Knowledge thread 1 provides that restriction by identifying what counts as unacceptable emergent phenomena. This restriction not only implies support for a positive social learning environment; it also addresses an ethical consideration [7.2.2] in this research because of my temporary role as a teacher at the Centre. Under these conditions, to *not* address the possible emergence of socially unacceptable behaviours and actions counts as an ethical problem because it opens up the possibility that the teachers will have to deal with these issues after I leave the Centre. To allow unacceptable behaviours to unfold by being blind to its possible emergence is to devalue the research on ethical grounds. Thus, both knowledge threads are important for this framework to be coherent, meaningful and useful for early childhood teachers and can therefore be used by teachers as a means of evaluating the enactment of a "games of chase" curriculum.

Chapter 9
Curriculum as teaching: Teaching stories

Chapter 9 is an element of Thread 3: Curriculum dynamics. It presents a view of the enacted curriculum as teaching in the form of teaching stories.

Summary: In this chapter, I

- explain the notion of a teaching story and the two forms of teaching stories presented in the thesis,
- explain how I implemented the framework for playing games of chase at the Centre,
- describe how the teaching unfolded,
- discuss the notion of a teaching story in the language of complexity.

9.1. Notion of a teaching story

A teaching story is a story that describes and explains my thinking and actions as a teacher in the enacted games of chase curriculum at the Centre. It is one of the three types of stories created as part of data analysis [6.5].

There are two forms of teaching stories presented in this chapter. The first form counts as a descriptive pattern [6.1.1] and relates to methodology. It explains the teaching strategies I used to implement the framework for playing games of chase at the Centre and discusses the roles of the following facets in the strategies: the tag belts, the routine before playing, game structure and design, and sharing with the Centre community.

The second form counts as a narrative pattern [6.1.1] and there are two narratives presented in this chapter. The first narrative describes the general patterns of teaching in a game episode and some of its variations. The other narrative describes the teaching drifts that unfolded in my efforts to teach children to identify who were playing. The first story can also be viewed as structural patterns and variations in a game episode while the latter as structural drifts across episodes.

9.2. Teaching strategies

The teaching strategies used were specific to the purpose of exploring games of chase. However, they built upon existing Centre conditions that counted as sources of coherence, randomness, redundancy, diversity, neighbour interactions and decentralisation [4.3]. Table 9.1 summarises the teaching strategies used in relation to the conditions for emergence [3.4], nested systems [2.3] and teaching intentions [8.1]. Some of the strategies contributed to more than one condition, for example, the routine before playing an episode. Others contributed to more than one teaching intention, for example, the strategy of allowing children to play with and without tag belts in different episodes. This suggests that there was a network of loose couplings among teaching strategies, conditions of emergence, systems and teaching intentions.

The teaching strategies identified in Table 9.1 represent a range of strategies used over the fourteen weeks. They are classified in terms of the conditions for emergence [3.4] and each strategy is linked with the relevant teaching intention(s) [8.1]. In Table 9.1, I make no reference to when, how or why each strategy was carried out or the sequence in which they unfolded. These details unfolded as structurally-coupled decisions, actions and outcomes,

and are embodied in the lives of the systems of knowers, knowledge and curriculum at different levels.

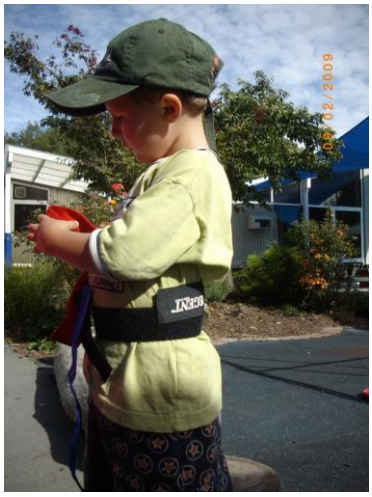
Table 9.1: Summary of teaching strategies in relation to nested systems, conditions for emergence and teaching intentions

Teaching strategies for	Details of teaching strategies & their relationships with teaching intentions
creating coherence in games of chase knowledge and curriculum	• I used tag belts to help children identify and be identified as players (TI1). • I developed a routine before playing an episode. This routine included putting on tag belts so that children could identify the players (TI1) and discussing as a group how to play (TI3). The discussion included a decision about how to tag (TI2) and was based on the simple framework for playing and changing our games (TI3).
incorporating randomness into games of chase curriculum	• I looked out for new ideas to incorporate some of these into our games (TI4). • I allowed some ideas emerging in play to be incorporated (TI3 & TI4). • I encouraged children who had not played before to join in (TI4).
encouraging diversity in games of chase knowledge and curriculum	• I allowed children to play with and without tag belts in different episodes (TI1, TI3 & TI4). • I encouraged different ways to tag (TI2) by changing the ways we tagged within an episode and by playing the same game (for example, tag) using different ways to tag (TI3 & TI4). • The children and I modified existing elements in a game and added new elements to a game, for example, roles, group size, rules (TI3 & TI4).
creating redundancy in games of chase knowledge and curriculum	• I developed a routine before playing an episode. This routine included putting on tag belts so that children could identify the players (TI1) and discussing as a group how to play (TI3). The discussion included a decision about how to tag (TI2) and was based on the simple framework for playing and changing our games (TI3). • I shared games with children and teachers by playing in a space that was highly visible and by weaving/coupling elements of games into other activities such as ICT, storytelling, art and craft and conversations (TI1, TI2, TI3 & TI4).
encouraging neighbour interactions through decentralisation of game of chase knowledge among knowers	• I shared games with children and teachers by playing in a space that was highly visible and by weaving/coupling elements of games into other activities such as ICT, storytelling, art and craft and conversations (TI1, TI2, TI3 & TI4). • I shared parts of games with teachers and parents in informal conversations, research newsletters and updates and the BS journal (TI1, TI2, TI3 & TI4).

9.3. The role of tag belts

The tag belts were used as tools to help children recognise players from non-players in an environment where (1) players and non-players could share the same play area, (2) children could join and leave an activity at any time, and (3) players were constantly moving about. In such an environment, it was not effective to simply tell children that they should know who were playing; they needed a visual tool to help them do this.

Although there were other options such as coloured bibs or coloured bands, I decided to use rip tag belts as the visual tools for two reasons. Firstly, they were suitable as visual tools. Secondly, the tag belts could also be used to help children learn different ways to tag; pulling off the flag from the belt could count as one of the ways to tag someone. Figure 9.1 shows a boy, Marcus, putting on a belt.



A rip tag belt consists of a black belt with two coloured flags. The coloured flags are attached to the belt by Velcro and can be easily pulled off the belt.
Here, Marcus puts on the rip tag belt by putting the black belt around his waist and attaching one coloured flags on his front and one behind him.

Figure 9.1: Rip tag belt

The use of tag belts was also linked to an element in game structure and design, that is, the element of players [Table 9.2]. By purchasing ten tag belts, I had set the maximum number of players in any one episode at ten. Although I wanted to give as many children as possible the opportunity to experience the game at any one time, I also wanted the game experience to be manageable for me and enjoyable for the players [9.4], and I felt that a maximum of ten players in a game episode would make for both a manageable and enjoyable game experience for all.

9.4. The role of developing a routine before playing

This routine consisted of two segments that featured regularly within a game episode. The first segment was putting on tag belts and the second was discussing as a group how to play the particular episode. The discussion involved making decisions on the four elements in games of chase, including how to tag [Table 9.2].

I decided to include a segment for putting on tag belts before playing as part of this routine because I could not assume that children initially would know the purpose of putting on tag belts or how to put them on. On the contrary, it seemed unlikely that the children would have seen or used a tag belt as it was not an item normally associated with early childhood education in New Zealand [Coupled knowledge 9.1].

Coupled knowledge 9.1: Activities and 'items' normally associated with ECE in New Zealand

Within ECE in New Zealand, there are some activities and 'items' that are part of the early childhood discourse. An example is the magnet board story, which is a mode of storytelling. To tell a magnet board story is to use a magnetic whiteboard and pictures with magnets attached to the back as storytelling tools. Children, teachers and parents who are or have been part of the New Zealand early childhood community recognise this as a normal part of life in this setting. Episode ST2 [VS: ST2] shows a magnet board storytelling experience while episode ARM3 [VS: ARM3] shows children making their own magnet board pieces. The latter can also be viewed as a craft activity.

Other activities that are normally associated with ECE in New Zealand and illustrated in the Visual Summary include reading [VS: ARM1] and mat time [VS: ARM6]. In some centres, activities related to the use of information and communication technology (ICT) have become or are normal (see, for example, Lee, Hatherly, and Ramsey (2002), Colbert (2006) and Ramsey, Breen, Sturm, Lee, and Carr (2007)).

Although tag belts are not normally used in ECE, the use of tag belts in this research opens up the possibility for these to be more widely used in playing games of chase, given its value as a learning tool.

Given children's initial unfamiliarity with tag belts, expecting children to put them on before playing could help to create a coherent and shared understanding of the role of the tag belts in a particular episode.

Similarly, I decided to set aside a segment for discussing how to play our game episode before we started playing because it was an opportunity for us to create some coherence and shared understanding around the design for that particular episode. In a newsletter to teachers and parents, I explained my purpose in relation to teaching game structure:

> I have included a short discussion around how we would play the game before we started playing. Hopefully, this can eventually raise children's awareness of the need to sometimes negotiate the rules and

> boundaries of a game before we start playing, bearing in mind that playing a game whose rules and boundaries emerge during play can also be appropriate in some situations. [VS: RNU1]

By embedding this routine as regular segments of a game episode, the routine itself would become a visible feature of the games curriculum. At the same time, the knowledge of tag belts, ways to tag and rules could 'spread' among the children who watched and/or played in the various episodes. Over time, this 'spreading' of knowledge across different children could give rise to a redundancy in the routine and knowledge in the sense that although no one individual would know everything about these, most children would eventually know enough to be able to play an episode.

9.5. The role of game structure and design

Game structure refers to the elements in a game and the ways in which these elements are related or organised. Some writers refer to these elements as components, game factors or variables and identify them differently (see Gallahue & Donnelly, 2003; Kirchner & Fishburne, 1997; Morris & Stiehl, 1999; Graham et al., 1998; Gump & Sutton-Smith, 1971). For example, Gallahue and Donnelly (2003) identify the following as components of a game: players, rules, boundaries, strategies and motor skills and movement concepts used or required. Morris and Stiehl (1999), on the other hand, identify the following as elements: purposes, players, movement, objects, organisation and limits. In all cases, however, a game's structure gives coherence to a game and forms the basis of a shared experience among players and spectators.

Game design refers to the decisions made about a game's structure. Gallahue and Donnelly (2003), Graham et al. (1998), Morris and Stiehl (1999), Kirschner and Fishburne (1997) make calls for teachers to consider the design of games we teach or play with children because game design strongly influences children's experiences of the game (Morris & Stiehl, 1999). When children have enjoyable game experiences, they are more likely to be "excited about participating in game-playing activities on their own" (Graham et al., 1998. p. 618).

In early childhood where a game can appear more like play [8.2], these design decisions can be pre-determined or emergent, explicit or tacit, negotiated by players or made by the teacher. When these decisions give rise to a game structure that has enough boundaries and flexibility, that is, it is an enabling constraint [3.5], children with diverse game experiences will have the capacity to enjoy the episodes they play. The boundaries give coherence and create

redundancy in game-related knowledge while the flexibility helps individual children to adapt the game to suit their game experience and knowledge. At the same time, this enabling constraint can give the group of players the capability to change the game structure within each episode.

In this research, I identified four elements of game structure that formed the basic elements in any game of chase. These elements, as shown in Table 9.2, afforded us the structure and flexibility to play and change the games at episode and activity levels. We discussed these elements before playing an episode and I framed the elements as questions so that children could easily understand them.

Table 9.2: Elements in game structure for games of chase at an early childhood setting

Element	Element framed as question(s)	Research notes
Name of the game	What is the game called? OR What are we playing?	The three main games of chase we played were *tag*, *What is the time Mr Wolf?* and *Big A, Little A*. Examples of non-chasing games we played were *Running Races*, *Bird and Bees* and *Creep up on Granny*.
Space	Where are we playing?	There were three main areas for playing, that is, the concrete area, the rubber mat area and the bark area [Figure 4.1]. The boundaries for each area were visually defined by the edges that made up the area. We tended to stay within the defined boundaries when we played on the concrete area but not when we played in the other two areas.
Players	Who are playing?	This element was very unpredictable and dynamic because children could enter and leave a game at any time during an episode. Episodes played with tag belts limited the number of players to ten and helped us to identify who the players were at any one time. Episodes played without tag belts tended to have four or fewer players and were less dynamic.
Rules	How are we playing?	In the early episodes when the games were relatively simple, we talked about what roles were in the game and how to tag someone. Later, as the games became more complex, our discussions included whether there was a safe place and where this was, how we would decide on who would be the next wolf or bird (that is, the chaser) and/or what we would do with the flags we pulled off other people's belts.

9.6. The role of sharing

In this research, sharing means making the following visible to the Centre community: (1) the games of chase curriculum, (2) the wider PhD research. Thus, there are two different but related facets to sharing. The first facet is sharing the games of chase curriculum in my role

as a teacher and the second is sharing the wider research in my role as a researcher. However, the distinction between the two facets is not clear-cut, for example, sharing the wider PhD research with families included sharing some facets of the enacted curriculum. Table 9.3 clarifies the details of each facet.

Table 9.3: Details of the two facets of sharing in this research

What?	Who?	Why?	When?	How?
Sharing games of chase curriculum	Sharing mainly with children and teachers	• To generate interest and encourage participation • To enable ideas to interact • As a strategy for collaboration	During the fourteen weeks of teaching	• By playing the games in a visible place • By coupling games-related facets to other activities • By showing videos, movies and Powerpoints of games and talking about these
Sharing wider PhD research	Sharing mainly with teachers, families and management	• To inform and communicate curriculum and research • As a means of getting feedback	During and after the fourteen weeks of teaching	• In daily conversations • By creating weekly newsletters and putting them on the university's learning management system, LEARN • By creating a research update as part of the Centre's termly newsletter to families • By writing learning stories for children's learning portfolio and sharing these with teachers • By creating monthly updates on my PhD LEARN site

In terms of conditions for emergence [3.4], the first facet of sharing relates to the condition of neighbour interactions within and across systems of knowers, knowledge and curriculum in the teaching and learning environment. For example, playing the games (activity) in a visible place means that children who were observing or participating (knowers) are able to notice

and make sense of these games (knowledge), implying a knowers-knowledge-curriculum coupling.

9.7. Teaching patterns and variations in game episode

There were several ways in which a game episode could be initiated, for example, as a request from children, as a suggestion from me and/or as an activity that unfolded from another activity. When an episode was initiated, there were a number of decisions that needed to be made, that is, where we would play, whether to use the tag belts and how we would play the games. Initially, I made many of these decisions myself and modeled them to the children, but later when the children became more familiar with the games, we negotiated these decisions.

On many occasions, we played on the concrete area although we did also play on the rubber mat area and the bark area [Figure 4.1]. The choice of where to play was coupled to other factors such as which spaces were available, the maximum number of players in the episode, how visible I wanted the episode to be to the children and whether we would be using tag belts to play.

If a decision was made to use tag belts, I would bring the box of belts out and place it in a visible place. I would then spend the next few minutes helping children to put on the tag belts because they were too long for the children to put on by themselves. On numerous occasions, other teachers helped as well and later, when I decided to shorten some of the belts, a number of the older children were able to put the belts on themselves. During this segment of putting on tag belts, it was not unusual for other children to gravitate towards us and either watch what we were doing or ask to play.

When it seemed as if whoever wanted to play were ready, we sat together and talked about how to play this episode. Our discussion generally revolved around the following questions although there were variations as to which questions we discussed and in which order:

- What were we playing?
- What roles would we have in this episode? What would we do in these roles? Who would take on which roles at the start?
- How would we tag someone?
- Did we want a resting place and if so, where would this place be?
- How would we change roles?

When these questions were more or less clarified, we would play until there was an interruption to the episode. Sources of such interruptions could be internal or external. Internal interruptions included stopping the game to help children put on or take off tag belts, re-negotiating rules of the game, negotiating roles and attending to children who had fallen down. External interruptions arose from calls by other teachers to put on sun screen lotion, have a drink on very hot days, or stop for morning tea or mat time.

However, there were also some changes that occurred within an episode that did not stop our play, for example, the float teacher taking children to the toilet [4.2.4], and children leaving and joining the episode without requiring my help to remove or put on tag belts.

There was no set duration for an episode. In most cases, the episode ended when one of the following situations arose: (1) it was time for morning tea or mat time [4.2.6], (2) no one wanted to continue playing or (3) the children and I decided to play something different.

9.8. Teaching drifts in helping children to identify who were playing

My efforts to teach children to identify players in an episode manifested itself as a practice of putting on tag belts. This practice had a coherent pattern that could be recognised by experienced players and spectators. It took place not only before playing but also during an episode when I would interrupt our play to help children put on the belts.

The children's first introduction to the tag belt took place on my first day at the Centre when Rachel, a 3-year old, requested to play a running game [VS: RMG1]. Although I had no intention of using tag belts in this episode, I used them because Rachel brought up the idea of identifying herself as a player using a name tag; this was something we had done in one of my visits before Christmas. After the game, I reflected on what I had done.

> "When Rachel reminded us that we needed to have a name tag to play the game, I saw this as an opportunity to introduce the tag belts. Upon reflection, it was not really a good idea to use tag belts with running races because it did interfere with the game; in running races, children can enter and leave the game at any time and it is of no major consequence if we don't really know who's playing and who's not. In a game of chase, however, it is important for children to be able to identify a player and be identified as one because, from experience, I have seen some children chase others who are not actually playing the game, and in the process, frighten them." [VS: RMG1]

Thus, over time, the practice of putting tag belts became associated with games of chase and not other activities. However, the use of the tag belts tended to be associated with organised games of chase because most play episodes involving chasing, for example, in episodes tag9, CH4 and CH5 [VS: tag9, VS:CH4, VS:CH5], did not involve the use of tag belts,.

On 2 March 2009, in an episode of *What is the time Mr Jaguar?* [VS: CH5] played with four boys, I asked the boys whether they wanted to use tag belts. They voted not to and I took the opportunity to point out who were playing and that we needed to chase only the players. This segment was the first recorded instance of a drift in the practice. It appears to be focused on raising children's awareness that they could decide whether or not to put on tag belts based on evaluating how many people were playing and/or knowing who the players were. Story 9.1 below is another recorded instance of this drift a few days later.

Story 9.1: Decision-making about tag belts

On 5 March, when Kay, Ray, Renea and I decided to play tag after morning tea [VS: tag13], Kay brought up the need to use tag belts and I suggested not using them because there were only four of us and we knew who were playing.

Kay: We need the belts … we need the belts for it.
Hanin: We need the belts on to play tag. Do you think that if we only play four of us, we don't need the belts because we know who's playing?
Kay: Yes.
Hanin: Yeah. So we might not need … if only four of us are playing, we don't need tag belts.

Later, we decided to play *What is the time, Mr. Wolf?* [VS: wolf6] and by then there were five players, that is, Kay, Ray, Renea, Jamie and myself. Harry and Edward noticed us playing.

Harry: What are you playing?
Hanin: We're playing *What's the time Mr. Wolf?*
Harry: But you need the belt!
Hanin: Well, there's only a few of us. (unclear) If you want to play …
Harry: I want a belt.
Hanin: Well, if you do then we'll bring the belts out, then there's lots of people playing. Shall I bring the belts out?
Several children: Yeah.
Hanin: Since there are lots of children playing now, ok.

There is no recorded explanation at that time of why I initiated this drift. However, there is evidence to suggest that this shift was coupled with my thinking around the player element in game structure [Table 9.2] since the shift occurred around the same period I was thinking about tinkering with group size and composition in the episodes I organised. In my journal entry on 28 February 2009, I wrote:

> From the experiences playing games of chase with children over the past several weeks, I am beginning to get a sense that, as a teacher, it may be useful to explore different teaching methodologies in games of chase. I guess the key factors in the teaching methodologies I am looking at is the number and composition of the children who are playing and how it impacts on my role as a teacher, the rules we set up for the game and the game experience itself.

As I see it so far, as a teacher, I can play chase with children

1. As a teacher-organised activity with a group of up to ten children. This would be the games that involve children entering and leaving the game at different times during a game episode and using the tag belts to identify children playing. The value of such an activity is that it gives all children the opportunity to (1) participate in chase games, (2) play with others they may not normally play with and (3) create interest in such games. I get a sense that my role is to co-ordinate the activity so that children benefit from participating in it, although the benefit they get may vary from child to child, from experience to experience.
2. As a focus activity for a small group of children who already normally play among themselves. Such an activity may be seen as an opportunity to generate or extend on interest in playing chase among friends. My role can perhaps be as a non-playing facilitator and observer or as a player.
3. As a focus activity for a small group of children who do not normally play (yet) among themselves. This focus activity can serve as a means of helping children learn to interact with each other and maybe eventually become friends.
4. As a focus activity for a small group of children who may not normally join in a big group of chase. This may or may not be in conjunction with 2 or 3, and can help that group of children participate in an activity they may be too shy to try out in a big group.

(OJ090228 – 0725 - Exploring teaching methodologies in games of chase)

Looking back, it seems reasonable that playing in small groups would make it easier for children to identify who were playing, especially in groups involving experienced players, older children and/or close friends, thereby making it unnecessary to use tag belts as visual tools. By giving children the opportunity to participate in decision-making about whether or not to wear tag belts, they could eventually learn to do so themselves.

9.9. Emerging knowledge

In this chapter, I have presented a view of curriculum as teaching. This view is presented as teaching stories which describe and explain teacher thinking and actions in the enacted curriculum. These teacher thinking and actions count as teacher knowledge which drew upon and influenced the curriculum design, that is, the views of curriculum as structure, process and content, while taking into consideration the local context of the Centre [Chapter 4]. In the language of complexity, a teaching story foregrounds the teacher as a knower and how her knowledge co-emerged with curriculum design and dynamics. In this sense, it shows the complicity of knower-knowledge-curriculum couplings from the perspective of the teacher-as-knower.

In this thesis, the different teaching stories

- explain the teaching strategies used to implement the framework for playing games of chase (curriculum as content) at the Centre and show the complicit relationship between these strategies and various aspects of the curriculum design, that is, the nested systems

(curriculum as structure), the conditions for emergence (curriculum as process) and teaching intentions (as part of curriculum as content),

- discuss the roles of various facets in the strategies, that is, the tag belts, the routine before playing, game structure and design, and sharing with the Centre community,
- describe the teaching patterns and variations in a game episode as it unfolded over time, showing an emergent pattern in curriculum at episode level, and
- describe the teaching drifts that unfolded in my efforts to teach children to identify who were playing, which was one of the four teaching intentions in the framework for playing games of chase with children.

I argue that although this chapter focuses on the teacher-as-knower, other knower-knowledge-curriculum couplings were also visible [9.8]. These couplings acted as triggers to changes in the teacher's knowledge.

Based on the teaching stories, I also argue that the teacher's role is one of collective consciousness (Davis, 2004). In this role, the teacher pays attention to existing and potential couplings and orients the children's attention to possibilities that can emerge from these couplings. Here, coupling can exist within and across (1) children's, teachers', community and societal interests and values, (2) available resources, (3) ideas and/or (4) events and activities. Davis writes about this role from a complexivist perspective:

> "Such is the role of the teacher in an eco-minded classroom: attending to and selecting from among those possibilities that present themselves to her or his awareness. In this sense, teaching is about *minding* – being mindful in, being conscious of, being the consciousness of – the collective." (p. 178, author's italics)

This view of curriculum as teaching is one of three elements in curriculum dynamics and contributes to the local curriculum theory for games of chase at the Centre. These are discussed in Chapter 12.

Chapter 10
Curriculum as activity: Curriculum stories

Chapter 10 is an element of Thread 3: Curriculum dynamics. It presents a view of the enacted curriculum as activity in the form of curriculum stories.

Summary: In this chapter, I

- explain the notion of a curriculum story and the two forms of curriculum stories,
- present the Visual Summary,
- present a narrative of how the activities directly related to games of chase unfolded at the Centre,
- discuss the notion of a curriculum story in the language of complexity.

10.1. Notion of a curriculum story

I conceptualise a curriculum story as a narrative that describes and explains how episodes and activities that were directly and indirectly related to games of chase unfolded at the Centre. It is another of the three types of stories created as part data analysis [6.5].

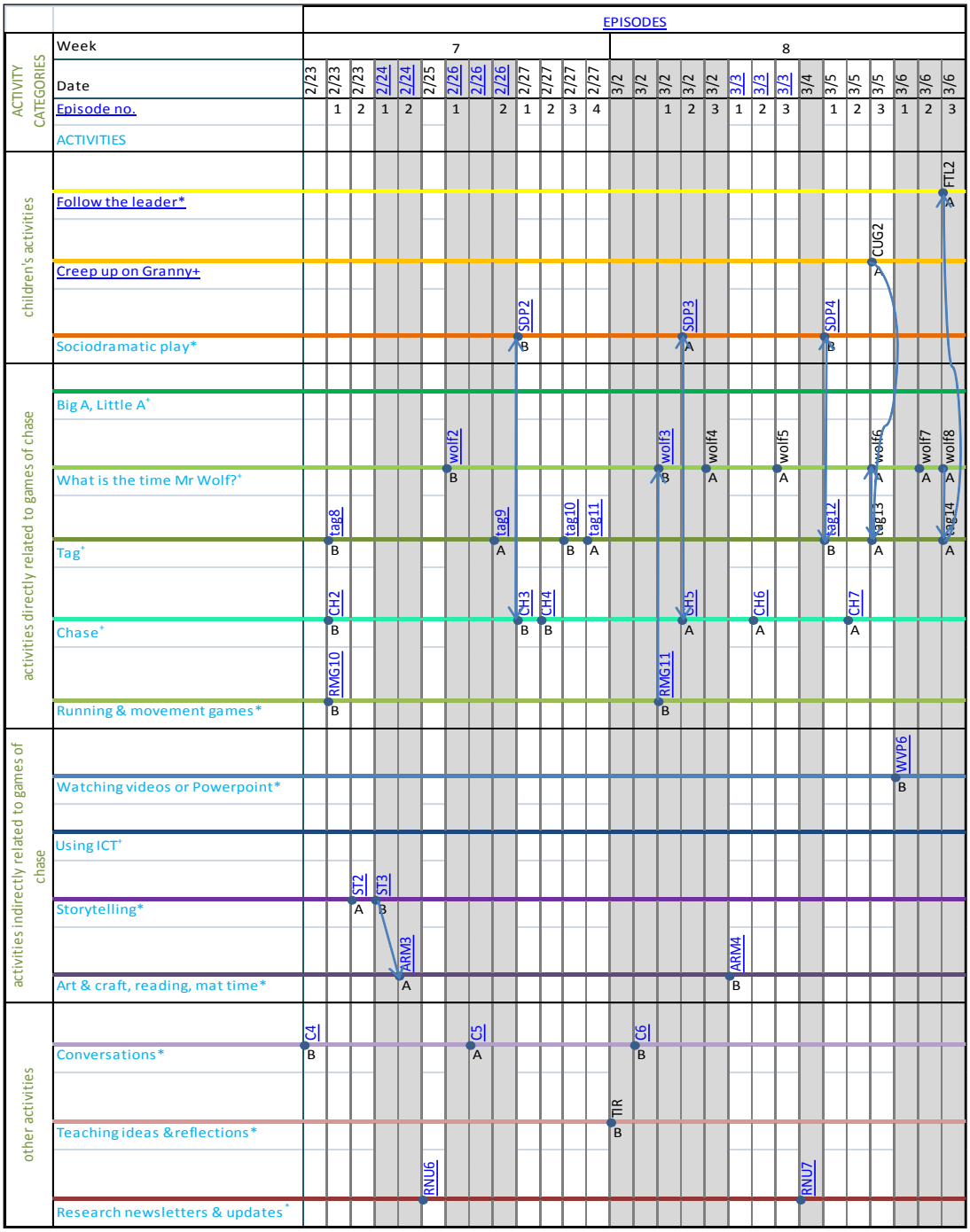
There are two forms of a curriculum story in this thesis. The first form is a visual narrative which represents a summarised or big picture view of curriculum related to games of chase. I refer to this visual narrative as the Visual Summary which shows how the episodes and activities directly and indirectly related to games of chase unfolded over the duration of the teaching phase. The second form is a textual narrative which represents a more detailed view of how activities directly related to games of chase unfolded at the Centre.

10.2. Visual Summary

The Visual Summary is a digital data display of the nested system of curriculum at episode and activity levels. This data display is an Excel 2007 document that summarises the data across the fourteen weeks. In addition, many, but not all episodes, are hyperlinked to either data analysis of episodes and/or to segments of data in one or more forms: episode summary, learning story, Big Side journal entry, photograph with text, PowerPoint presentation, video and audio recording. By summarising data related to the system of curriculum and linking it with data analysis of episodes or segments of data, this Visual Summary embeds relevant elements from the systems of knowers and knowledge into the system of curriculum [Figure 2.1].

The Visual Summary is provided on a DVD as an attachment to this thesis. The technical specifications for the Visual Summary are found in Appendix D. Figure 10.1 shows an image of the Visual Summary for Weeks 7 and 8, and illustrates some of its features:

- It summarises the activities the children and I engaged in, those I observed children playing as well as activities I undertook as part of sharing with the community [9.6, 7.2.3]. These activities are organised into one of four activity categories: children's activities, activities directly related to games of chase, activities indirectly related to games of chase and other activities. A description of each activity category is revealed when the user moves the mouse to the relevant cell.
- It describes each episode briefly. These descriptions are revealed when the user moves the mouse to the cell with each episode code, for example, SDP1, wolf1. Any embedded



KEY

- Episode is related to bug-related focus in curriculum
- B — Episode took place before morning tea
- A — Episode took place after morning tea
- x → y — Episode y emerges from episode x
- x ⟷ y — Episodes x and y are embedded in each other
- x ····· y — Episode x can be seen as episode y and vice-versa
- * — Not all observed episodes of the activity are included in the Visual
- \+ — All observed episodes of this activity are included in the Visual Summary

Figure 10.1: Image of Visual Summary for Weeks 7 and 8

analysis or data segment for an episode will be indicated in the description and embedded as a hyperlinked file.

- It identifies when the episodes took place (in Week, Date and Episode no.) and whether they took place before or after morning tea (A for after, B for before). Details are also provided for some of these items, for example, 2/24.
- It enables the user to identify the temporal relationship between different episodes within and across activities by looking across the Date, Episode no. and/or activities. For example, SDP2 took place after wolf2 but before wolf3.
- In some cases, it identifies whether a particular episode was directly related to another episode, and if so, the nature of the relationship is identified in the key in Figure 10.1.
- It identifies episodes of activities that were related to the bug theme, which the teachers were focusing on during part of the fourteen-week period. The key in Figure 10.1 shows how these episodes are labeled.

The Visual Summary also alludes to, but does not clearly show, a number of complex relationships between activities and episodes. For example, the activity labelled "Watching videos and PowerPoint" (WVP) includes episodes related to games of chase [VS: WVP1, WVP2, WVP3, WVP4, WVP5, WVP12, WVP13, WVP14, WVP15, WVP16, WVP17, WVP18] as well as those related to the bug theme [WVP6, WVP7, WVP8, WVP9, WVP10, WVP11]. Episodes related to the latter became indirectly but significantly related to games of chase when the teachers decided to introduce the bug focus into the curriculum, and I decided to incorporate the bug focus as part of games of chase [10.3.5]. In addition, the WVP activity also counted as part of the strategy for sharing the games of chase curriculum with children and teachers [Table 9.3]. The nature of complex relationships suggests that the Visual Summary embodies the complicit and co-emergent nature of the episodes and activities in the nested system of curriculum.

10.3. Curriculum patterns, variations and drifts in activities directly related to games of chase

In this curriculum story, I describe and explain how the different activities directly related to games of chase unfolded over the fourteen weeks. These activities were running games, tag, *What is the time, Mr(s) Wolf?* and *Big A, Little A,* identified in the Visual Summary as RMG, tag, wolf and BALA respectively. The story includes a description of the simple version of each game (patterns), the variations that unfolded within each activity (variations) and the

influences that gave rise to a new game being played and/or created (drifts). Although this story focuses on descriptions of curriculum as activity, elements of curriculum as teaching and learning are visible in the form of knower-knowledge systems embedded and embodied in the descriptions of activity.

10.3.1. Curriculum activity: Running games

I decided to begin by playing running games with children first based on an observation I had made while playing tag with the children during one of my visits before Christmas. On that occasion, I had noticed a number of children crashing into each other and crying, which triggered memories of similar experiences while teaching physical education (PE) classes with six-year olds. I realised then that playing running games first could help children to develop the spatial awareness necessary for playing games of chase and in the process minimise accidents during play [Coupled knowledge 10.1].

Furthermore, playing simple running games could help me focus on developing the routine before playing [9.4]. As the children became more familiar with the routine, it would fade into the background and I could focus more attention on teaching game structure [9.5].

Coupled knowledge 10.1: Comparing games of chase and running games

Although both games of chase and running games generally involve running in a group and in a confined space, games of chase involve (1) the additional locomotor skills of dodging, fleeing and chasing (Graham et al., 1998), (2) more frequent and faster changes of speed, directions and pathways and (3) the need to identify the chaser from amongst all the moving bodies. In movement terms, games of chase would require a greater degree of spatial awareness than running games, hence its increased complexity.

According to Steven-Smith (2004), spatial awareness is an important skill in game playing. It involves "the practice of using personal space and general space responsibly" (p. 52) and a tacit or explicit understanding of where the body can move. In the context of playing games of chase, it embodies a wide range of movement concepts such as looking for space, balance, agility, speed, coordination and changes in pathways and direction. In order to play safely and responsibly, children need to be able to see a space and carry out movements successfully within that space.

The first running games involved running around a course that we decided together [VS: RMG1, RMG2, RMG3].

In week 3, I introduced children to a running game called *Birds and Bees* [Coupled knowledge 10.2],

Coupled knowledge 10.2: Simple version of *Birds and Bees*

There are two roles: the caller(s) and the runner(s). All runners crouch, with heads down, and listen to the caller. When the caller calls out "birds", the runners remain crouching. When the caller calls out "bees", the runners get up and run around a pre-negotiated course.

which was an adaptation of another game I used to play as a PE teacher, that is, *Crows and Cranes*. The rules of the game included the roles of caller and runners and the need for the runners to listen to what the caller was saying. We made variations to the game structure [VS: RMG4 & RMG5]. One of the variations involved the caller calling out 'Stop', which was a call for the runners to come back to the start. Otherwise, they would have to continue running.

I noticed some children enjoying the role of the caller, some of whom only participated as callers. For example, Kelly participated in some episodes of the game *Birds and Bees* but only as a caller. This observation led me to wonder about this interest:

> Although it (Birds and Bees) is a running game, children can take on the role of a caller or a runner or sometimes both. I have noticed that there have been some children who have chosen to take on mainly the caller role and they seemed to thoroughly enjoy the role. Would some of these children have participated in the game at all had it not included such a role? What does this say about running games that involve several roles and/or roles that do not involve running? [VS: RNU2]

We also played *Stop and Go* [Coupled knowledge 10.3], which was simpler than *Birds and Bees*. This game involved the caller dictating to the runners when they had to stop and when they could run [VS: RMG8]. When I decided to use this game as an introductory activity [VS: RMG11, RNU7], I varied the movements we did on 'Go' to include movements such as skipping, running backwards and flying like a butterfly.

Coupled knowledge 10.3: Simple version of *Stop and Go*

There are two roles: the caller and the movers. When the caller calls out "go", the movers will run around on the concrete area. When the caller calls out "stop", the movers freeze.

10.3.2. Curriculum activity: *Tag*

We started playing *tag* earnestly in Week 5. By then, I felt that the children had had enough experience of running in a big group. We began with the simplest version of *tag* I could imagine [Coupled knowledge 10.4] which introduced children to the tag belts, tagging and a running role for the chaser. Over seven episodes (that is, episodes tag2 to tag 8), a number of variations to the game unfolded:

Coupled knowledge 10.4: Simple version of *Tag*

There are two roles: the chaser and the runners. The chaser runs and tags the runners by touching them.

- Incorporating the role of a caller who called out 'Stop' and 'Go' to which the chaser and runners had to respond by stopping and running respectively [VS: tag2].

- Tagging by hugging and tickling [VS: tag2], pulling off flag from the runners' tag belts (rip tag) [VS: tag3, tag5], and putting hoops over someone (hoop tag) [VS: tag8].
- Designating a safe place where a chaser cannot tag runners who are in this place [VS: tag4].
- Having multiple chasers or taggers in an episode [VS: tag4] or everyone pulling off each other's flags [VS: tag5].

10.3.3.Curriculum drift to *What is the time, Mr(s) Wolf?*

A drift began to unfold when, by the end of week 5, I had a sense that many of the children had a strong interest in stories and socio-dramatic play. This recognition was based on my observations that

- many children enjoyed reading stories with teachers throughout the morning and at mat time, including stories that I read or told [VS: ST1, ARM1, ARM2],
- some groups of children regularly engaged in socio-dramatic play which revolved around characters and/or stories, for example playing Barbie [VS: SDP1] and playing jaguars [VS:SDP3],
- some children appeared to enjoy the role of caller in the game *Birds and Bees* [10.3.1].

When I realised that these interests were present, I began thinking about incorporating characters and a story into our game of chase since a story could be used as a means of sharing the rules of the game with the children. I decided to introduce children to *What is the time Mr. Wolf?* because the game could be linked to the story *The Three Little Pigs and the Big, Bad Wolf.* I knew from my past experience as a teacher at the Centre that some of the children already knew the game and/or the story; I had seen the game played and the story told as a magnet board story [Coupled knowledge 9.1].

10.3.4.Curriculum activity: *What is the time Mr(s) Wolf?*

We played our first game of *What is the time, Mr. Wolf?* in week 6 [VS: wolf1]. I made a decision to couple the game with the story *The Three Little Pigs and the Big, Hungry Wolf,* which was an adaptation of the story some of the children knew. This adaptation deliberately avoided creating an impression that the wolf was necessarily bad. In this adaptation, the wolf tried to eat the pigs because it had not eaten for days and was very hungry. When it eventually fell into a pot of stew that the pigs were making, it explained its reason for wanting to eat the pigs. The pigs allowed the wolf to share their food on condition that it

never again tried to eat them. The wolf agreed and they became friends. One of the games the friends played together was *What is the time, Mr Wolf?*

The first few episodes of the game were coupled with storytelling and craft episodes of the story. For example, the first episode embedded the story [VS: wolf1] while the second episode was preceded by storytelling episodes [VS: ST2, ST3] and a craft episode [VS: ARM3].

The simple version of the game incorporated elements of tagging, tag belts, a safe house and running from the game of tag [Coupled knowledge 10.5]. However, there were other elements that were new, that is, new characters, a related story and verbal interactions between the characters. It also incorporated the logic of *if … then* in the interactions and the element of anticipation which were present in the game *Birds and Bees* but not in tag.

Coupled knowledge 10.5:
Simple version of *What is the time, Mr(s) Wolf?*

The wolf sits in the tyre while the pigs call out "What is the time Mr(s) Wolf?" from their house. If the wolf calls out a time like one o'clock, the pigs call out again. If the wolf calls out "Dinner time" or "Lunch time", the pigs run out of their house and the wolf chases them. Pigs can go back to their house to be safe. The wolf chooses the next wolf.

Over time, we changed the rules of the game. Below were some of the changes.

- Instead of calling out the time as "one o'clock", the wolf called out "Kay time" [VS: wolf2] or "time to have a shower" [VS: CH5].
- Initially, I chose the next wolf [VS: wolf3]. Later, we embedded a rule for deciding who would be the next wolf, for example, the current wolf chose the next wolf [VS: wolf5, wolf9, wolf10].
- We played with families of wolves and families of pigs [VS: wolf11, wolf12].

10.3.5. Curriculum drift to *Big A, Little A*

The seed for another curriculum drift was sown almost at the same time we started playing *What is the time Mr(s). Wolf?* In a conversation with the other teachers [VS: C3], they mentioned that they were organising a trip to the museum to attend a lesson on bugs because they had noticed many of the children showing an interest in the bugs that were in the Centre's outdoor area. In preparation for the trip and as part of this interest, they were incorporating the theme of bugs and insects into activities at the Centre. I said that I would incorporate this theme into my games after I introduced children to the game *What is the time, Mr(s) Wolf?*, but at that time, I had no idea how I was going to this.

I joined in with this bug and insect theme by (1) showing a movie of a caterpillar transforming into a butterfly [VS: WVP6, WVP8], (2) making a PowerPoint version of a book about insects in the garden [VS: WVP7], (3) making magnet board pieces of bugs and insects with children [VS: ARM5], and (4) playing the game *Bug in a rug* during mat time [VS: ARM6]. However, I left the idea of incorporating it into the games for three weeks before I began to ponder on this again as illustrated by my journal extract:

> … given that the teachers are now providing quite a few activities around insects and bugs, I also wonder whether the time is ripe for making some slight changes to the game 'What is the time, Mr(s) Wolf?' to incorporate some elements of the bug world. [VS: RNU8]

I decided to combine some elements of *What is the time Mr(s) Wolf?* with some elements of the bug world and the game *Creep Up on Granny* [Coupled knowledge 10.6]. The latter was a game that Kay had tried to teach me on several occasions [VS: CUG1, C4, CUG2] but which took me a long time to understand. It was from the process of combining these various elements that the game, *Big A, Little A* emerged.

Coupled knowledge 10.6:
My understanding of *Creep Up on Granny*

Grandma faces away from others who start from a line. Grandma can walk forward and others follow behind her. When Grandma turns around slowly, everyone freezes. Whoever does not freeze goes back to the start.

10.3.6. Curriculum activity: *Big A, Little A*

I created a story around the game and told children the story [VS: ST4]. This story had some distinct similarities with the story of *The Three Little Pigs and the Big, Hungry Wolf*:

> As a means of drawing the children to the game and to illustrate the rules within the game, I told a magnet board story using the pieces of bugs I had made last week with the help of some children. The story revolved around some bugs that came up with a way to stop a bird from eating them, and in the process became friends. After becoming friends, they invented the chasing game 'Big A, Little A'. [VS: RNU9]

The game included a chant [Coupled knowledge 10.7] which some children initially found

Coupled knowledge 10.7: Simple version of *Big A, Little A*

We play on the concrete area using two opposite ends of the rubber mat area as 'lines' to mark our positions. The bird stands at one end of the rubber mat while the bugs (all other children) stand at the other end. The bird faces away from the bugs.

The bugs creep up towards the bird, repeatedly chanting

Big A, Little A, bouncing B,

(Child's name) bird's asleep and he/she can't catch me

When the bird turns around to look at the bugs but doesn't say anything, all the bugs have to freeze both their movement and singing. When the bird looks away, the bugs start moving and chanting.

When the bird turns around to look at the bugs and says, "I'm awake", he/she starts chasing the bugs. The person who is tagged becomes the next bird.

difficult to remember. I showed the children videos of the game [VS: WVP12, WVP13, WVP15, WVP17] and incorporated the chant during mat time [VS: WVP14] to help them remember it.

Apart from the chanting, the game also had other elements that were different from *What is the time, Mr(s) Wolf?* These included the chaser (bird) facing away from the runners (bugs) and the creeping and freezing movements. The element of anticipation as the bugs waited for the bird's response was also different from that in *Birds and Bees* in the sense that it resembles a game of peek-a-boo that many young children enjoy.

Over the seven episodes of *Big A, Little A* that we played, we included the following variations:

- The bugs chose which bug to be and moved like the bug [VS: BALA3, BALA5]. Later, Enya chose to be an animal instead of a bug and several others, including myself, followed suit [VS: BALA6].
- We incorporated the role of adult and baby birds and bugs [VS: BALA6].
- We played in different playing areas, that is, the rubber mat area [VS: BALA1], the bark area [VS: BALA4, BALA7] and the concrete area [VS: BALA2, BALA5, BALA6].
- Sometimes we played with one bird [VS: BALA1, BALA3] and at other times we played with two or more birds [VS: BALA5, BALA6].
- Although we played mainly with the rule that whoever was tagged became the next bird, in BALA7, the two girls decided who the next bird was [VS: BALA7].

10.4. Emerging knowledge

In this chapter, I have presented a view of curriculum as activity in the form of curriculum stories which use activity as their organising structure. The curriculum stories describe and explain how episodes and activities that were directly and indirectly related to games of chase unfolded over the fourteen weeks at the Centre. They are told in two related forms, each with a different purpose and providing different views of curriculum as activity.

The first form, referred to as the Visual Summary, is a visual narrative that summarises the episodes and activities, and embeds details relating to contexts, episodes and relationships between episodes. The Visual Summary also alludes to some of the more complex relationships between episodes and activities, relationships which are more easily sensed than described [10.2].

The second form is a textual narrative that describes and explains how the activities directly related to games of chase unfolded. This narrative is presented in terms of curriculum patterns, variations and drifts in these activities, which includes the emergent game *Big A, Little A.*

In both forms, although curriculum is organised in terms of activities, elements of curriculum as teaching (teacher thinking and actions) and learning (children's thinking and actions) are visible in terms of how the teachers' and/or children's decisions and actions influenced and were influenced by the activities.

In the language of complexity, the curriculum stories foreground the curriculum dynamics (enacted curriculum) as a nested system of activity at multiple levels while simultaneously making visible the complicity of the systems of knowers and knowledge in the dynamics. In other words, knower-knowledge systems were embedded and embodied in the descriptions of the systems of activity that unfolded.

This view of curriculum as activity is coupled with the view of curriculum as structure in the sense that in the latter view, curriculum is conceptualised as a system of activities that (1) is different but inseparable from systems of knowers and knowledge in ECE, and (2) exists at different levels. I argue that this coupling of the two views of curriculum has enabled the use of activity as an organising structure for both designing and describing curriculum without losing sight of systems of knowers and knowledge.

The view of curriculum as activity counts as an element of curriculum dynamics. Like the view of curriculum as teaching, it contributed to the emergence of the curriculum dynamics and the local curriculum theory for games of chase at the Centre [Chapter 12].

Chapter 11
Curriculum as learning: Learning stories

Chapter 11 is an element of Thread 3: Curriculum dynamics. It presents a view of the enacted curriculum in the form of learning stories.

Summary: In this chapter, I

- explain the notion of a learning story and the two forms of learning stories,
- describe the children's learning in relation to the three teaching intentions,
- describe an individual child's learning and contributions to the enacted curriculum,
- discuss the notion of a learning story from the perspective of complexity thinking.

11.1. Notion of a learning story

In this thesis, I have used three types of stories to describe or view curriculum. Curriculum stories describe the activities that unfolded. Teaching stories present stories of teaching while learning stories are narratives that describe children's learning as they participated in life at the Centre. This chapter presents examples of the third type of story created as part of data analysis [6.5].

There are two forms of learning stories related to two levels of knowers, that is, the levels of the group and the individual [2.3, Figure 2.1]. At the level of the group, a learning story describes the variety of learning patterns across individual children-as-knowers. At the level of the individual child, the story focuses specifically on the learning of an individual child.

11.2. Variety in learning patterns: Range of examples of children's learning

In this learning story at the level of the group, I present a range of examples of learning that unfolded for children, bearing in mind that what is presented here are just some of the outcomes and that the outcomes were different for different children. These examples of learning represent how learning is embodied in the children's experience and actions.

I present children's learning in relation to three teaching intentions [Chapter 8]: (1) using tag belts and identifying who were playing (TI1), (2) tagging in different ways (TI2), and (3) experiencing of game structure (TI3). These are presented in the form of three tables. Each table describes children's embodied learning in relation to a particular teaching intention and identifies some instances of the learning as evidence. Table 11.1 describes children's embodied learning in relation to using tag belts and identifying who were playing [8.1, Table 9.1, 9.8]. Table 11.2 describes children's embodied learning in relation to ways of tagging in games of chase [8.1, Table 9.1]. Table 11.3 describes children's embodied learning in relation to game structure [8.1, Table 9.1, 9.5].

Table 11.1: Children's learning in relation to using tag belts and identifying who were playing

Children's embodied learning	Sample of evidence
Some children shared with others what they knew about tag belts	• In a video recording for her parents about 'running races', Rachel said, "We can play only if we have a tag belt on". [VS: CMC1] • In episode tag2, children explained to my research assistant, David, how to tag.
Some children helped others to put on tag belts	In episode tag2, Hemi helped Bill to put on the tag belt.
Some children looked for tag belts before joining in a game that had already started	In the analysis of wolf3, several children knew to get a tag belt to put on before joining the game, for example, Marcus (Segment 8), Genevieve (Segment 9) and Henry (Segment 17).[VS: wolf3]
Some children asked for tag belts before starting a game	• "The children have become used to the idea of using the tag belts in chasing games, especially in a big group game, so that they can identify who is playing and who isn't. Some of them have been reminding me to get the tag belts when they hear that there's a game coming up." [VS: RNU10/1] • "Last Thursday, ... I decided to limit the number of children to a maximum of four. I found a willing group in Kay, Rachel and Edith, and we put on the tag belts which Kay insisted on." [VS: CUG3]
Some children participated in decision-making about whether to put on tag belts to play a game.	• I asked a group of boys whether they wanted to put on tag belts, and they decided not to. [VS: CH5, 9.8] • In conversations with children about tag belts, I modelled explaining my decision for not using them. [Story 9.1]

Table 11.2: Children's learning in relation to ways to tag in games of chase

Children's embodied learning	Sample of evidence
Children experienced the same ways of tagging across different episodes	• We tagged by touching in a number of episodes, for example, tag1 [VS: tag1], tag9 [VS: tag9], wolf2 [VS: wolf2], BALA7 [VS: BALA7]. • We tagged by pulling the flags off the tag belts in a number of episodes, for example, tag3 [VS: tag3], tag4 [VS: tag4]. • We tagged by putting a hoop over a person in several episodes, for example, tag8 [VS: tag8], CH7 [VS: CH7], SDP4 & tag 12 [VS: tag12].
Children experienced different ways to tag in an episode	• In episode tag2, we tagged by touching and by hugging [VS: tag2]. • In episode tag5, we tagged by touching, by pulling off flag and by tickling [VS: tag5]. • In episode CUG3, we tagged by touching and by pulling off flag
Some children made suggestions on how to tag in an episode	• Harry explained, "You touch somebody" as he touched himself to show how to tag someone [VS: tag1]. • In episode tag2, Rebecca suggested to David that he tag by hugging.
Some children talked about the way(s) to tag	• In a video recording for her parents about 'running races', Rachel demonstrated how to tag by tapping another child on the back. [VS: CMC1] • A group of children and I were watching and talking about videos of tag4. I wrote about this in a learning story for one of the boys, Oliver: "A few minutes later, we were watching people pulling flags off each other's belt. We noticed Marcus with lots of flags and I said, 'Look at Marcus. Look at how many flags he's got'. Oliver replied, 'He looks like an Indian'. Later, when I asked the children which version of tag they liked, Bill, Oliver and Rachel said they liked the version where 'you pull the tag off'".
Some children learnt that the way we tag can emerge from our decisions about rules of the game and/or the tools we use	• A group of children and I played hoop tag using the hoops that the children had in their hands [VS: tag12, SDP4]. • Marcus, Tama, Ian, Ray and I decided to play *What is time Mr. Jaguar?* without tag belts, which meant that we tagged each other by touching [VS: CH5].

Table 11.3: Children's learning in relation to game structure

Children's embodied learning	Sample of evidence
Children played a variety of games with different rules and levels of complexity	• We played running games, *tag*, *What is the time, Mr(s) Wolf?* and *Big A, Little* A [10.3].
Children participated in and contributed to group discussions on how to play a particular episode before playing	• We regularly discussed how to play an episode [9.4]. • Marcus, Tama, Ian, Ray and I discussed how to play a game and Marcus suggested rules almost identical to *What is the time Mr Wolf?* but with jaguars instead [VS: CH5]. • Kay decided how to play *Creep up on Granny* in CUG3 [VS: CUG3, 11.3]
Some children suggested changes to elements of the game while we were playing	• In RMG4, I initially set the rules of the games. We began with only one caller but by the end of the episode, there were four callers. We also started by running once around the climbing boxes but Rachel decided to keep running a few times. Later, the callers called out "Stop" as a way of getting the runners to come back to the start [VS: RMG4]. • In BALA4, Bill and Enya introduced the idea of having two birds at a time. Before this, we played with only one bird [VS: BALA4].

11.3. Learning at level of individual knower: Kay's learning

This learning story focuses on Kay's learning over the course of the teaching phase. Kay was one of two girls who introduced me to the game *Creep up on Granny*, and thus played a big role in the creation of the game *Big A, Little A*. The latter game, in turn, inspired her to change the way she played *Creep up on Granny*. In this section, I focus on describing her learning and discuss that learning in relation to Te Whāriki (Ministry of Education, 1996) in a later section [12.2].

Kay was three years old at the time of this research in 2009. She attended the Centre four full days a week and generally arrived at the Centre with Mum, Jacqueline, before 9 am each morning. I knew Kay prior to this research; she joined the Big Side from the Toddler Unit around the time I started working at the Centre between 2007 and 2008.

11.3.1.Before *Creep up on Granny*

Kay was an active participant in many of the activities from the beginning. The Visual Summary shows that she participated in running games [VS: RMG2, RMG7] and tag [VS: tag1, tag3]. She was also present at the storytelling episode [VS: ST1] which led to the decision to play RMG7.

I also noticed that Kay appeared to enjoy spending time on the flying fox, which was located adjacent to the concrete area where we played most of our games of chase. This location was a good vantage point for observing the games. There were at least two occasions when she joined us after spending some time at the flying fox, for example, in tag2 and tag3, both of which took place on 9 February 2009; the former occurred before morning tea while the latter after.

An analysis of the videos showed that in tag2, Kay watched us as she played by herself on the flying fox. Later, she sat at the boundary of the concrete area and watched us. She requested to join in when Bill decided to stop playing. Kay played until we stopped for morning tea.

11.3.2.Kay introduces me to *Creep Up on Granny*

When Kay and Jacqueline arrived on the morning of 16 February 2009, they told me that Kay and Rachel had learnt to play a new game, *Creep Up on Granny*, at a birthday party. I was not familiar with this game and suggested to Kay to teach it to me later.

After morning tea, I went outside to play wrestling with some children and noticed Kay and Rachel playing *Creep Up on Granny* [10.3.5, VS: CUG1]. I asked the girls if they could teach me how to play and they agreed. However, each had a different version of the game. Kay's version seemed to emphasise the actions of grandma turning around and those behind her stopping or freezing when she did this.

About two weeks later, on 5 March 2009, Kay asked to play *Creep up on Granny* while she, Ray, Renea and I were chatting after morning tea [VS: CUG2]. Kay wanted me to be Granny and I agreed, and not long after we started, I began to include a tagging element into the games by turning around to tag the children as they got closer to me. Then, Kay asked to play tag and we did this without tag belts since there were only four of us [Story 9.1]. But our game of tag [VS: tag13] did not last very long either. We started playing *What is the time, Mr(s) Wolf?* [VS: wolf6] on Kay's suggestion, a game she had actively participated in [VS: wolf1, wolf2, wolf3].

11.3.3.*Creep up on Granny* drifts towards *Big A, Little A*

Kay did not initiate another episode of *Creep up on Granny* for the next two weeks but continued to play *What is the time, Mr(s) Wolf?* [VS: wolf8]. By then, I had learnt from *Creep up on Granny* and incorporated some elements of it into another game, *Big A, Little A* [10.3.5]. Kay was not present at the storytelling session when I introduced the rules of this new game but she joined in one episode of *Big A, Little A* later [VS: BALA2].

On 19 March 2009, a group of children wanted to play a game of chase and we agreed to play after morning tea. Kay approached me after morning tea to initiate playing and when I asked her to invite two other children to join us, she invited Rachel and Edith. However, the girls could not agree what to play; Kay wanted to play *Creep up on Granny* while the other two girls wanted to play *Follow the leader*. In the end, we agreed that Kay would watch the three of us play *Follow the leader*, after which we would play her game [VS: FLT3].

After playing *Follow the leader*, Rachel and Edith decided to play with Enya. Renea asked to join us but changed her mind as I was putting on her tag belt, leaving Kay and I as the only two players in *Creep up on Granny* [VS: CUG3]. When I asked Kay how we would play the game, she explained it to me [Story 11.1]. Her explanation included the elements of chasing and tagging which were not present in earlier versions of the game.

Story 11.1: Kay's explanation of *Creep up on Granny* in CUG3

Kay: You have to tag someone and then you pull someone off like that (Kay showed me tagging by touching and pulling off the flag).
Hanin: Oh, ok. So Granny, Granny's going to walk or stand still?
Kay: She's going to stand still.
Hanin: She's going to stand still.
Kay: And she's going to tag someone and she's going to pull the belt off. (Kay tugged at her front belt to show how it was done.)
Hanin: So, when do people know that she's going to tag them?
Kay: [Yeah, and then
Hanin: She's going to turn] around and say … something?
Kay: And then they go.
Hanin: They go. Ok, let's try then.

As we walked towards the tree where Granny was going to stand, we continued to talk about the game.

Hanin: So you're going to be Granny.
Kay: No, you're going to be Granny first.
Hanin: Ok, I'll be Granny and if I turn around you have to freeze.
Kay: Yes, and if you say I'm awake, you you [(unclear)
Hanin: I'll chase you.]
Kay: (unclear)
Hanin: I'll pull the belt off.
Kay: Yeah. That's it.

Note: Text in [ ] means we were talking at the same time.

Kay and I played until we were joined by John. Later, when I needed to go inside to get ready for the morning's mat time, I asked Kay and John if they wanted to ask another teacher

to join them. They chose Josie who played with them until the end. Below is a story of the episode that Josie wrote for Kay's learning journal.

Story 11.2: Kay and John play *Creep up Granny*

Date: 24th March 2009 Observer: Josie

Today Hanin, John and Kay were playing a chasing game, called "Creep up Granny". I was observing outside when they came up to me and asked if I could play with them, as Hanin had to leave and do another job. I told John and Kay that I would love to play but I did not know how to. "That's all right we will show you Josie," Kay told me.

The first rule that Kay told me was that I needed to wear a tag belt. I asked her why and she said that they would know that I was playing if I was wearing one and that they could tag me and not scare me. I agreed that this would be a great idea. After I had put one on Kay told me that I could stand and watch her and John play a game to see how it worked. This was a great Idea as I had never heard of the game "Creep up Granny".

After I had observed their game they came to me and told me "you need to stand by the tree and say I'm awake" then you chase us around and catch us. I joined in as one of the people creeping up on Granny, every time being caught when I was chased. "It's now your turn Josie," Kay told me. After every turn Kay and John would take a turn and make sure that everyone had a turn at being Granny before they had another turn.

Interpretation:

Wow, John and Kay what a wonderful game you played with one another. I wonder where you learnt this game or did you make it up? Kay I can see that you are very aware of the other people who you are playing with and their feelings. I could see this through how you made sure that we all had a turn before we started a new round of chasing Granny and that you wanted to make sure that you knew we were playing. Well done. This shows me that you are developing a sense of responsibility and are using it to keep the game fair and fun for all involved.

Pathways and Possibilities:

Kay I would like to continue to encourage you to develop your leadership skills that you were using to take responsibility with. Would you like that? I can help you to develop this through scaffolding you in interactions we have and creating opportunities were you can teach others about your interest areas

Child's Voice:

"Did you like teaching me the game of "Creep up Granny"?"
"I loved the looking and stopping, and I was chasing"

Four weeks later, on my last day at the Centre, Kay asked me to play *Big A, Little A* with her and Edith [VS: BALA7]. I agreed but did not want to draw attention to our game because I had already wrapped up the tag belts to give to the Centre as a present. So I asked the girls to suggest a different place to play our game and Kay brought us back to the tree where she, John and I had played *Creep up on Granny* four weeks ago.

11.4. Emerging knowledge

This chapter presents a view of curriculum as children's learning in relation to the enacted games of chase curriculum. This view is presented as learning stories which describe children's learning in the curriculum. The descriptions focus on children's explicit and/or embodied knowledge (as the knower-knowledge couplings) in and across episodes and activities. They identify learning as explicit, as embodied and/or embedded in children's experiences and actions, and as changes in knower-knowledge couplings.

There are two forms of learning story, highlighting learning at different levels of children-as-knowers. The first form of learning story describes learning at the level of children as a collective which represents emergence of children's collective knowledge; this is presented in terms of a variety in learning patterns that unfolded over the duration of the games of chase curriculum. The second form describes learning at the level of the individual child in terms of her relationships with people, places, ideas, activities and things over fourteen weeks and how these triggered changes in her knowledge in, through and about games of chase and *Creep Up on Granny*. These changes represent emergence in an individual child's knowledge.

The stories and the above discussion suggest that learning can be viewed as on-going transformation of knowers, knowledge and activities. This view extends on Davis and Sumara's (2006) notion of learning as on-going transformation of knowers and knowledge. I argue that changes in activity also constitute learning because the nature and dynamics of activities we engage in as knowers also change as our knowledge changes, that is, knowers, knowledge and activities are co-emergent systems [3.3]. In addition, learning as transformative change embodies both gradual and dramatic changes associated with structural drift and self-organisation respectively since both are processes in co-emergence [3.2].

In the language of complexity, this view of curriculum as learning foregrounds the collective and individual child-as-knower and how his/her/their knowledge co-emerged with curriculum dynamics (the enacted curriculum). In this sense, it shows the complicity of knower-

knowledge-curriculum couplings from the perspective of the child-as-knower. It counts as the third element of curriculum dynamics in the local curriculum theory for games of chase at the Centre [Chapter 12].

Chapter 12
Local curriculum theory and curriculum vision

Chapter 12 is Thread 4: Curriculum theory. It discusses the emergent concept of local curriculum theory and presents a curriculum vision.

Summary: In this chapter, I

- reflect on an important decision I made in the thesis exploration,
- use the six views of curriculum to present the local curriculum theory for games of chase at the Centre,
- discuss the concepts of curriculum design, curriculum dynamics and local curriculum theory,
- present the local curriculum theory as a curriculum vision,
- discuss the contributions to knowledge in relation to curriculum.

12.1. Reflections

In this section, I present an on-going reflection of the thesis in which I articulated my struggle to decide on the direction of my thesis. The decision I made eventually emerged in the struggle to address the multiple factors or constraints I faced in making that decision. Thus, this reflection marks an important milestone in my journey with complexity thinking and curriculum. It also counts as an example of (1) writing for thinking [5.3.1], and (2) striving towards research that is methodological [1.4].

I began the thesis exploration with the intention of occasioning and describing emergence in early childhood curriculum. Although I focused specifically on games of chase as part of the curriculum, I always had it in mind that whatever emerged would/could/should have some bearing on other facets of curriculum and/or on curriculum in general. My thesis exploration so far has given rise to a local curriculum theory for games of chase which explains the occasioning and describes the emergent phenomena; the emergent phenomena included a new game, some practices, teacher thinking and children's learning. The local curriculum theory is itself an emergent phenomenon, brought forth in the dynamic and complex interactions of two other emergent phenomena, that is, curriculum design and curriculum dynamics.

I have spent weeks wondering about this local curriculum theory and the hopes I expressed in Chapter 1. How can this local curriculum theory contribute to knowledge about early childhood curriculum? How can it contribute to the development and emergence of a disciplinary knowledge base for early childhood physical education? How can it contribute to the knowledge of complexity thinking in education? These questions swirl with my deep desire that teachers and researchers can somehow create some value from this local curriculum theory. To this end, I have considered some possible ways that can prompt teachers and researchers to create their own value from this theory. Three of these involve using the local curriculum theory as a starting point for further explorations: (1) exploring games of chase at other early childhood settings, (2) exploring other facets of early childhood physical education such as fundamental movement patterns, and (3) exploring how to teach complexity thinking in ECE and/or teacher education.

At the same time, I have ventured into literature for ideas and insights, and discovered that I have stumbled onto the vast field of curriculum studies. Kelly (2009) explains that curriculum studies is an inter-disciplinary field of study in its own right and is neither an applied science nor a study of methods in curriculum. He describes it as

> "a critical, analytical explanation of the curriculum as a totality, a theoretical/conceptual and practical/empirical examination of all the many dimensions of the curriculum debate and of curriculum planning, a critical evaluation of curriculum theories and practices, and a form of inquiry which goes far beyond considerations of mere methodology and transcends both particular subject specialisms and particular age ranges." (p. 28)

Kridel (2010) and Fleener (2002a) allude to the multi-faceted nature of curriculum studies. They refer to curriculum theory, curriculum design, curriculum evaluation, curriculum development, curriculum inquiry as a few of many curriculum-related phenomena that are implicated in and are a part of the field.

I am both excited and uncomfortable by this discovery. I am excited because I have entered the field accidentally and in an informal way, without enrolling specifically in a curriculum course; accidentally stumbling into something 'new' is always a pleasant surprise. It is opening up a whole new area to explore and there will be lots of ideas and insights emerging from this extended exploration of my initial thesis focus. Yet the thought of an extended exploration in a field that seems vast makes me feel uncomfortable because the dateline I have set myself to complete this thesis is looming. How much breadth and depth of the field can I explore within the time I have left? Amidst the ideas, the insights and the pressure, I decided to focus on the contribution of the local curriculum theory as a curriculum vision that is both insightful and forward-looking (Doll & Gough, 2002). I have chosen this focus because it marks the beginning of an

> intentional exploration of curriculum studies in a way that can enable me to make those contributions to knowledge and, hopefully, meet my dateline.
>
> (OJ101031 – 0708 – Reflections of the thesis so far)

12.2. The local curriculum theory for games of chase at the Centre

The local curriculum theory for games of chase at the Centre is an emergent phenomenon which describes and explains the games of chase curriculum that unfolded at the Centre between January and April 2009. This phenomenon first emerged during the knowledge creating phase when I noticed and recognised a coupled relationship between two other emergent phenomena, that is, the curriculum design and the curriculum dynamics.

The local curriculum theory for games of chase is presented in the thesis report in terms of its two elements, curriculum design (Thread 2) and curriculum dynamics (Thread 3), and is distributed across six chapters. Chapters 2, 3 and 8 present the curriculum design, which counts as the designed aspects of the local curriculum and explains a design for occasioning emergence in the games of chase curriculum. Chapters 9, 10 and 11 present the curriculum dynamics, which counts as the enacted aspects of the games of chase curriculum and describes how the curriculum unfolded at the Centre.

The local curriculum theory for games of chase shows that (1) it values both children's and teachers' interests, (2) it enables teachers and children to broadly and deeply explore facets of games of chase together, and (3) it focuses not only on following children's interests, but also generating children's interest in a new activity or curriculum area.

I argue that, although the local curriculum theory for games of chase is conceptually described in terms of curriculum design and curriculum dynamics, the research methodology and design (Thread 4) are also complicit in its emergence, and therefore, cannot be ignored. I discuss three examples from the thesis to support this assertion.

The first example relates to complex relationship between the data analysis, interpretation and (re)presentation strategy [Chapter 6] and the local curriculum theory for games of chase at the Centre in the sense that there is an embodied and embedded presence of the strategy in the theory and vice-versa. This complex relationship is illustrated in the Figure 12.1 which shows how elements in the strategy (coloured boxes) are connected to elements in the local curriculum theory for games of chase (uncoloured boxes). The figure shows that conceptually, there is a web of connections between the strategy and the local curriculum theory. For example, the Visual Summary can be seen as part of the strategy since it is an

integral part of the curriculum story [10.2], embodies both narrative and descriptive patterns [6.5] and arose from the initial investigation to create a graphic reconstruction [6.5, 6.7]. At the same time, the Visual Summary is also part of the local curriculum theory for games of chase at the Centre because it embodies and embeds multiple levels of curriculum, which is part of the conceptual framework and curriculum design.

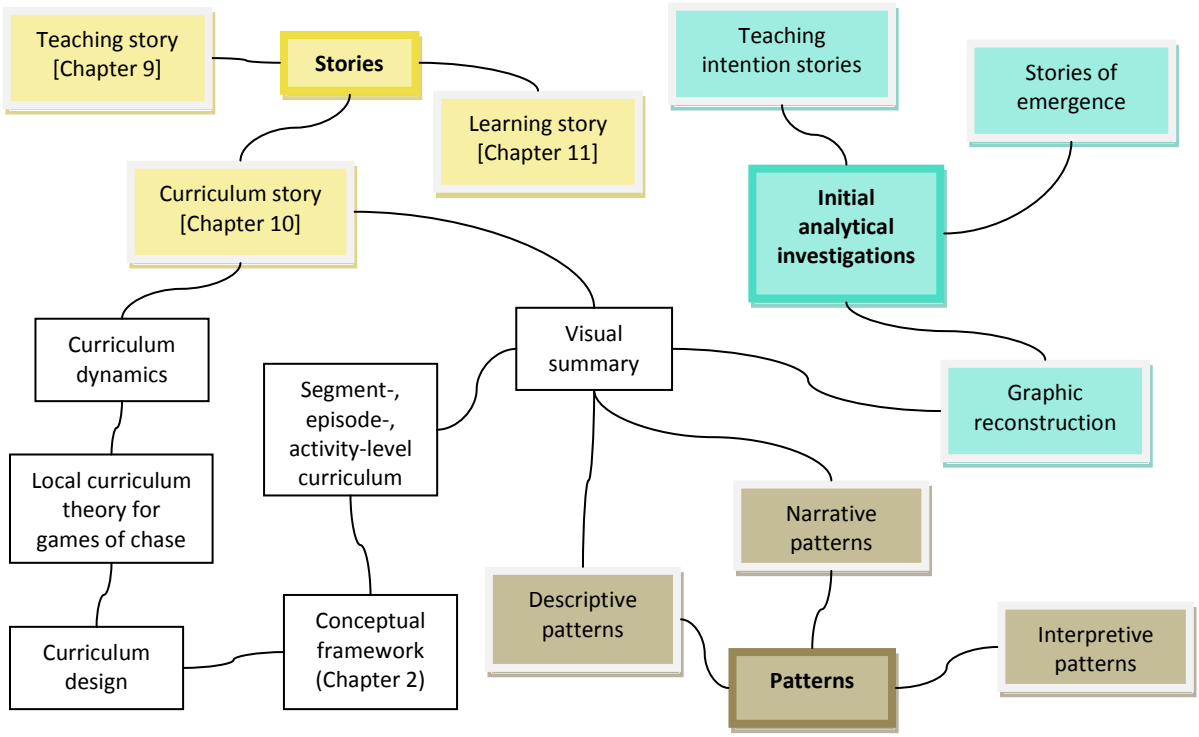


Figure 12.1: Complex relationship between strategy for data analysis, interpretation and (re)presentation and the local curriculum theory for games of chase

The second example concerns the role of Te Whāriki (Ministry of Education, 1996) [4.1]. Although Te Whāriki's principles and strands were not made explicit in the local curriculum theory, they are present in an embodied form. For example, Kay's learning story [11.3] shows how she was empowered to share a game she had learnt at a party, how she took the leadership role in some of the episodes and how, through continued participation in various activities, she adapted the game to include rules from the game *Big A, Little A*. The story and its interpretation make no mention of Te Whāriki's principles and strands in her learning but it is not difficult to get a sense that she was empowered to learn and grow, that there was an acknowledgment of both her world beyond the Centre and her contribution to the games of chase curriculum, and that she was encouraged to explore not only games of chase but also the role of a leader.

The third example relates to the role of the Centre context [4.2] in the local curriculum theory. Drawing from the importance of identifying existing and new conditions for emergence at a particular setting [3.6], I tacitly analysed the Centre context for its contributions to the conditions for emergence [4.3] and used this analysis to inform the design and enactment of the games of chase curriculum. This analysis is embodied in the decisions made about the teaching strategies and in the day-to-day interactions [Chapter 9].

12.3. Emergent concepts in the thesis

12.3.1.Relationship between an emergent phenomenon and the concept to describe it

The emergence of the phenomenon I refer to above as the local curriculum theory for games of chase prompted me to create and use a concept to describe it so that I could understand it better. Fleener (2002a) writes that "(m)eaning and understanding are a function of language as our understandings and ideas are revealed through the language we use" (p. 13). I considered using the terms 'a living curriculum', 'a complex curriculum', 'an emergent curriculum' and 'a local curriculum' to describe this phenomenon before eventually deciding on the concept of local curriculum theory for three reasons. Firstly, the emergent phenomenon was an articulated form of curriculum arising from my data analysis of curriculum [6.1]. It appeared consistent with Kliebard's (1982) notion of curriculum theory as (1) a coherent effort to understand the vague concepts that arise when we attempt to address questions related to curriculum, and (2) "an integrated cluster of sets of analyses, interpretations and understandings of curricular phenomena" (p. 19). Secondly, the phenomenon generally referred to as curriculum and our theories about curriculum are inseparable from each other; their relationship is similar to the relationship between the thesis exploration and the thesis report [1.5]. Thirdly, I wanted to situate the theory in the context of the games of chase the children, teachers and I played at the Centre over the duration of the teaching phase; hence the notion of local.

Thus, the phenomenon I refer to as the local curriculum theory for games of chase gave rise to the concept of local curriculum theory, which was intended as a tool to understand the former. Since then, both the phenomenon and the concept have existed, for me, as a structural coupling in the sense that changes to my understanding of the phenomenon prompted me to revise my understanding of the concept and vice-versa. In other words, both the phenomenon and the concept are co-emergent or complicit in each other's changes so that

they are simultaneously different and inseparable from each other. This relationship also applies to the other phenomena and related concepts used in this thesis, that is, curriculum design [12.3.2], curriculum dynamics [12.3.3] and all the six views or facets of curriculum [Chapters 2, 3, 8, 9, 10, 11].

12.3.2.Curriculum design

In this thesis, I adopt Terzidis' (2007) notion of design as a conceptual activity that involves clarifying an idea to be acted upon or articulated in a visible form. Terzidis elaborates on the meaning of design and identifies its relationship with planning:

> "Design is about conceptualization, imagination and interpretation. In contrast, planning is about realisation, organization, and execution. Rather than indicating a course of action that is specific for the accomplishment of a task, design is a vague, ambiguous, and indefinite process of genesis, emergence, or formation of something to be executed, but whose starting point, origin or process often are uncertain. Design provides the spark of an idea and the formation of a mental image. It is about the primordial stage of capturing, conceiving, and outlining the main features of a plan, and, as such, it always precedes the planning stage." (p. 69)

Based on the above notion of design, the image of the curriculum design that emerges from this thesis is one of a coupling of three views or elements, that is, a coupling of curriculum as structure, curriculum as process and curriculum as content. The coupled relationships take two forms: (1) structural coupling [2.2.1, 2.2.3] of the three elements in their development and (2) a loose coupling [2.2.2, 2.2.3] of purposes in the sense that each element serves a different purpose and makes a different contribution to the overall purpose of the curriculum design. This means that while each element has its own coherence, it also plays a role in supporting the other elements. The coupled relationships also mean that the curriculum design exists in a nested relationship with its elements as shown in Figure 12.2.

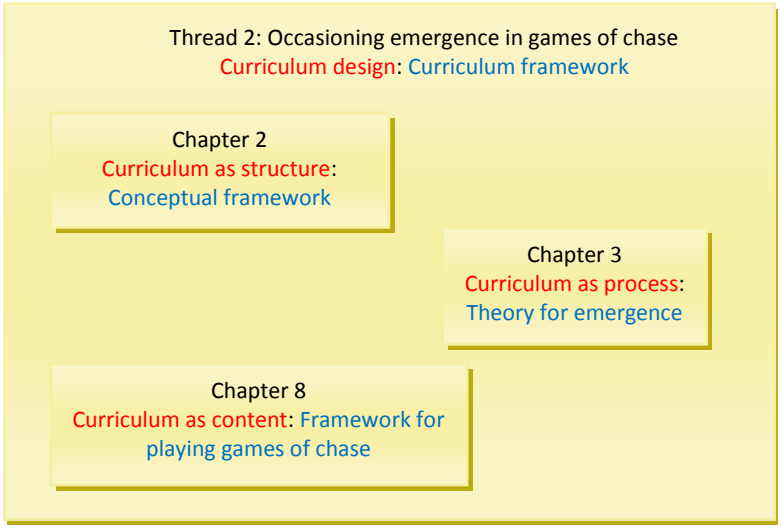


Figure 12.2: Nested relationship between curriculum design and its elements

I draw upon Kelly's (2009) notion of curriculum to argue that the notion of curriculum design embodies the idea of a total curriculum. Kelly writes,

> "(W)e will understand by the term 'curriculum' the overall rationale for any educational programme. Much of what is said about curriculum development will, of course, be of relevance to the problems of development within individual subject areas, but the prime concern must be with the totality." (p. 9)

The totality I mean here refers to the activity level curriculum and not the centre level curriculum [2.3]. At the activity level, a total curriculum not only identifies and justifies the curriculum content (games of chase), it also articulates the rationale for using complexity thinking as the underlying discourse and explains how it can be used. Here, it is important to note that the activity of games of chase was the overt curriculum because the children were conscious of the games of chase curriculum. Complexity thinking, on the other hand, was the hidden curriculum since children were not conscious of this aspect of curriculum. It was, however, made visible to them intentionally in the enacted curriculum so that they could unconsciously notice and eventually recognise complexity thinking. The intention was that by initially making games of chase the overt curriculum and complexity thinking the hidden curriculum, children could consciously focus on learning in, through and about games of chase and unconsciously learn complexity thinking. Unconsciously learning complexity thinking means learning to think and act in ways that demonstrate (1) an awareness of couplings, and (2) a focus on creating synergies from the couplings in ways that open new possibilities and benefit individuals and groups. Over time, when children tacitly knew complexity thinking, it would be possible to find ways to bring the discourse to their consciousness.

The view of curriculum as structure identifies curriculum as a nested system of activities that is different but inseparable from systems of knowers and knowledge; hence it identifies what counts as curriculum and its relationships with other systems in ECE. Such a structure enables teachers to organise curriculum in terms of episodes and activities and consider individual and collective learning within and across episodes and activities.

The view of curriculum as process identifies occasioning emergence as the focus of curriculum, where occasioning emergence means prompting new, diverse and creative possibilities in activities and knower-knowledge couplings. It explains the meaning of emergence and the processes and conditions associated with occasioning emergence. It enables the teacher to consider these possibilities at different levels of the systems of curriculum, knowers and knowledge. It prompts the teacher to design curriculum that is an

enabling constraint in his/her teaching situation while bearing in mind that emergence can only be brought forth amidst the complex on-going interactions in teaching and learning.

The curriculum content is an enabling constraint that allows teachers to consider the balance between providing structured boundaries and allowing children the freedom to choose elements to incorporate into games of chase in early childhood. It identifies a small number of key assumptions and important knowledge in a curriculum domain, including any necessary restriction(s), and implies that teachers and children can enact the curriculum in many possible ways as long it does not involve breaching the restriction(s). This enabling constraint allows teachers and children to play games of chase to suit their own abilities and interests without compromising the collective interests at the centre. At the same time, it prompts teachers to focus his/her teaching on expanding possibilities in activities and learning.

12.3.3.Curriculum dynamics

The term *curriculum dynamics* draws from dynamical systems theory which views the dynamics of a system as the patterns of behavior of the system under a certain set of conditions. Dynamical systems theory studies the dynamics of a system under different conditions and can be viewed as a qualitative analysis of a system's patterns of behaviours (Mosekilde, 1996). I use curriculum dynamics to refer to descriptions of the enacted curriculum, where descriptions of the enacted curriculum are descriptive and narrative patterns [6.1, 6.5]. These descriptions emerge from the qualitative analysis of the coupled systems of knowers, knowledge and curriculum that unfolded during the teaching phase.

Enacted curriculum refers to the lived experiences of the children as they participated in the games of chase curriculum during the teaching phase. It has the same meaning as Kelly's (2009) notion of received curriculum which is the actual curriculum or the reality of the children's experiences. It includes both the overt and the hidden curriculum. The former refers to aspects of curriculum that are intended for children to learn while the latter refers to aspects of curriculum that are unintended or even deliberately hidden from children (Kelly, 2009) and include the values, norms and structures of the educational setting. The hidden curriculum is also referred to as the implicit curriculum (Eisner, 2002) or collateral learning (Dewey, 1963).

I argue that although curriculum dynamics describes the enacted curriculum at the Centre, the enacted curriculum cannot be fully described because it involves the structural coupling of

systems of knowers, knowledge and activities at multiple levels. This structural coupling means that over time, the enacted curriculum becomes indescribably complex [3.3] and any attempts to describe the enacted curriculum can only be partial. This thesis presents the curriculum dynamics as three partial views from different perspectives of curriculum-related phenomena, that is, curriculum as teaching, as activity and as learning. The relationship between curriculum dynamics and its elements is similar to that of curriculum design and its elements, and is shown in Figure 12.3.

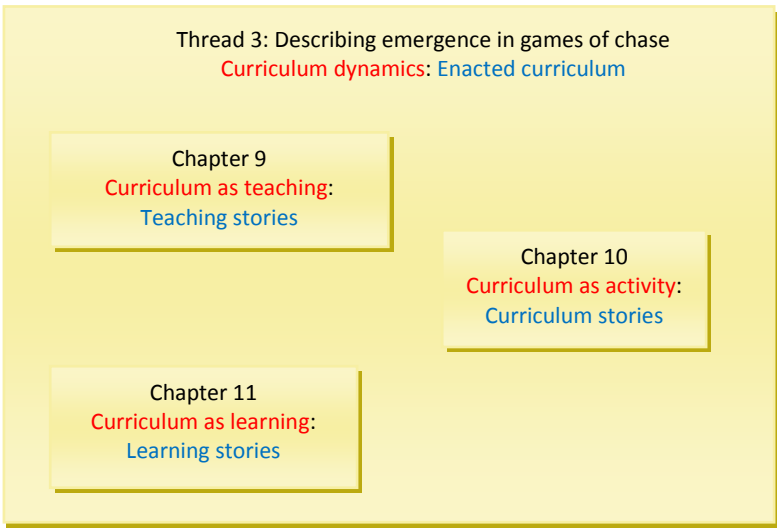


Figure 12.3: Nested relationship between curriculum dynamics and its elements

The view of curriculum as teaching describes and explains teacher thinking and actions in the enacted games of chase curriculum, where the teaching involves the role of a collective consciousness [9.9] who pays attention to and selects from a range of possibilities that emerge in play. This view foregrounds the teacher as a knower and how his/her knowledge co-emerges with curriculum design and dynamics. It shows curriculum dynamics from the perspective of the teacher-as-knower while keeping visible other knower-knowledge-curriculum couplings that acted as triggers to changes in the teacher's knowledge. This view can be presented as teaching stories in the form of a descriptive pattern or a narrative pattern [9.1].

The view of curriculum as activity describes how the activities that were directly and indirectly related to the games of chase curriculum unfolded during the teaching phase. This description includes teachers' and children's thinking and actions that influenced and were influenced by the activities. In other words, it foregrounds curriculum dynamics as a nested

system of activity at multiple levels while simultaneously making visible the complicity of the systems of knowers and knowledge in this dynamics. This view of curriculum dynamics can be presented as two different forms of curriculum stories, that is, a visual narrative and a textual narrative [10.4].

The view of curriculum as learning describes children's learning in the enacted games of chase curriculum, where learning is seen as on-going transformation of knowers, knowledge and activities [11.4]. This view foregrounds the individual and collective child-as-knower and how his/her/their knowledge arises in the day-to-day teaching and activities. It shows curriculum dynamics from the perspective of the child-as-knower while keeping visible some of the knower-knowledge-curriculum couplings that acted as triggers to changes in the child's or children's knowledge. This view can be presented as learning stories at the levels of the group (collective child-as-knower) and the individual [11.4].

12.3.4.Local curriculum theory

A local curriculum theory is an explanation and description of curriculum that is specific to a particular teaching and learning setting and duration, and involves 'seeing' curriculum from the perspective of complexity thinking. It is a theory which embodies both theory and practice, and arises from the coupling of two elements.

The first element is the curriculum design which articulates a teacher's conceptual understanding of how to occasion emergence in a particular facet of curriculum content. The second element is the curriculum dynamics which is a description and explanation of the emergence that unfold in the curriculum enacted by the teacher(s) and children. The coupled nature of the two elements means that over time, both curriculum design and curriculum dynamics unfold from and enfold in each other; they are complicit in each other's emergence at the same time that their complex interactions give rise to the local curriculum theory. I argue that this understanding of a local curriculum theory resonates with Doll's (1993) assertion that theory should be grounded in and developed from practice and in terms of local "states of affairs" (p. 162) or local context. I also argue that a local curriculum theory embodies a curriculum that values multiple dimensions of knowing that are both expressed and embodied, including thinking, acting, feeling, intuition and mindfulness (Begg, 2008).

A local curriculum theory is a complex system of knowledge that is coupled to complex systems of knowers and activities. Its nested structure [Figure 1.3] and its structurally-

coupled interactions with knowers and activities are two features that are consistent with the nature of complex systems [2.1].

A local curriculum theory is also an emergent theory in two ways. Firstly, it is emergent in its intention to occasion emergence. This intention to occasion emergence means that, from a complexity thinking perspective, a local curriculum theory focuses on expanding possibilities in teaching, learning and activities, and in ways that are logical, ethical and meaningful at individual and collective levels.

Secondly, it is emergent in the sense that it is brought forth in the acts of designing and enacting the local curriculum. By acts, I mean individual and/or collective decisions, ideas and actions by teachers and/or children that influence the form and direction of the local curriculum theory in ways that may be intentional or unintentional, direct or indirect, immediate or delayed, visible or invisible; these can be at the inter-action, segment and episode levels of the nested system of curriculum [2.3]. These acts unfold from and enfold in each other.

When these acts are characterised by reflection, evaluation and decision-making by the actors, they count as recursive acts that give rise to a curriculum characterised by recursion (Doll, 1993). Doll explains the nature of a recursive curriculum:

> "(i)n a curriculum that honors, values and uses recursion, there is no fixed beginning or ending. As Dewey pointed out, every ending is a new beginning, every beginning emerges from a prior ending. Curriculum segments, parts, sequences are arbitrary chunks that, instead of being seen as isolated units, are seen as opportunities for reflection." (p. 178).

A local curriculum theory, therefore, is both emergent and recursive in nature, and each local curriculum theory is unique and embodies its own unique history.

The emergent nature of a local curriculum theory also resonates with Doll's (1993) notion of a self-organising curriculum. He argues that a self-organising curriculum, as a postmodern curriculum, should embody diversity, multiple perspectives and explorations. In the local curriculum theory as conceptualised in this thesis, diversity counts as one of the conditions for emergence in the theory for emergence [3.4], multiple perspectives are visible in the three views of curriculum dynamics [12.3.3], and explorations are a feature of the games of chase we played [10.3] and the data analysis strategy [6.4]. Time is also an important feature in a self-organising curriculum as it enables the natural drifts in systems of knowers, knowledge and curriculum to arrive at the edge of chaos where self-organisation occurs [3.2].

Doll (1993) also emphasises the self-organising curriculum's focus on currerre, where currere refers to the process of running and the path that is created in the running as opposed to a set course to be run. He writes:

> "Curriculum will be viewed not as a set, a priori 'course to be run', but as a passage of personal transformation. This change of focus and subject will place more emphasis on the runner running and on the patterns emerging on the course run, although neither the runners nor the course can be dichotomously split and transformation will emerge from the activity itself, not be set prior to the activity" (p. 4).

This notion of curriculum suggests that the 'course to be run' can be viewed as the planned curriculum (Kelly, 2009), that is, what is made explicit in curriculum documents, and currere as the received curriculum (Kelly, 2009) [12.3.3]. While I agree that currere is important, I suggest that the planned curriculum is equally important, especially in the current climate of teacher accountability and politicisation of curriculum (Kelly, 2009). However, the local curriculum theory, with its focus on emergence, does not envisage the planned curriculum as a set course, but more as a 'space for running' which the teacher can create by transforming the dictated 'course to be run' so that there is both structure and flexibility. It follows then that currere can be viewed as the 'running in that space' from which will emerge the individual and collective patterns in and of running. I argue that curriculum design fits the image of 'a space for running' while curriculum dynamics aligns with the image of 'running in that space'. Furthermore, the images of a self-organising curriculum envisioned in the local curriculum theory honours both public and personal agendas in an emergent curriculum (Collins & Clarke, 2008), that is, it responds to curriculum mandates imposed by authorities at the same time that it is "responsive to and respectful of individual and collective student learning agendas" (p. 1003).

12.4. Curriculum vision

Gough (2002) identifies and distinguishes between vision in everyday and educational discourses:

> "In everyday speech …, 'vision' refers to the sensory system with/in which we embody much of what counts most to us as knowledge. … Yet vision in much of educational discourse – especially if it is inscribed as '*a* vision' – can also refer to seemingly disembodied, remote, abstract and even chimerical prospects of futures in which we place little trust …" (p. 3).

He argues that, like poetry, a curriculum vision is an invention that embodies the author or creator and can be experienced by others. Doll and Gough (2002) use the concept of curriculum vision to emphasise the insightful and future-focused qualities of curriculum inquiry while Fleener (2002b) problematises the creation of such a curriculum vision:

> How are we to describe our vision of a spirit-imbued, process-oriented, holistic, organic, ecological, postmodern curriculum without limiting or reducing our ideas to unrecognizable and meaningless dimensions?" (p. 152)

I offer the local curriculum theory as a curriculum vision for an early childhood curriculum that focuses on both teachers and children exploring the depth and breadth of a curriculum domain in ways that (1) are generative and recursive, (2) view curriculum as both the "space for running" and currere, and (3) value both children's and teachers' interests. This curriculum vision includes both the concept of a local curriculum theory and the local curriculum theory for games of chase. Through the concept of local curriculum theory, in which the concepts of curriculum design and curriculum dynamics are embedded, we see the insightful and generative nature of this vision. Through the local curriculum theory for games of chase, we experience the vision as it was enacted by the teachers and children at the Centre. It is a vision that represents, as Gough (2002) puts it, my "struggles not only to speak of but also to *enact* curriculum renewal and invention" (p. 2).

I argue that the future-oriented focus of this vision lies not as a theory to be replicated or copied but in its potential role as a perturbation to knower-knowledge couplings to trigger on-going change and eventual transformation. As a trigger, the local curriculum theory for games of chase can, for example, be seen as a starting point for creating other local curriculum theories since complexity thinking enables us to recognise similarities within and across complex phenomena (Davis & Sumara, 2006). To use this vision as a starting point is to draw upon the recursive nature of the local curriculum theory for expanding future possibilities.

I support the argument about the future-oriented nature of the curriculum vision by briefly and tentatively discussing below one of several possible areas of future exploration that can be triggered by using the local curriculum theory as a starting point [12.4.1]. This possibility is personal to me based on my interest in early childhood physical education [1.2] and I acknowledge that the possibilities that arise for different readers are likely to be different, given that as complex knowers and structurally-determined systems, our individual responses to the same perturbation are determined by our embodied histories and knowledge [2.2, 2.2.1]. In this acknowledgement, I agree with Begg (2008), who writes that

> "(t)eaching and learning are always linked with curriculum in the broad sense and I began to see the curriculum as influencing the identity of teachers and students while at the same time they influenced curriculum. For me this fitted with two ideas – *to live is to know*, and, *we are what we live*. (p. 208, author's italics)

I also argue that using the curriculum vision as a starting point for exploring other curriculum possibilities can enable changes in understanding about the concept of local curriculum theory. Thus, the curriculum vision is a dynamic vision, not a static one, and the vision that is articulated in this thesis report counts as a particular state of the vision at this point in time.

12.4.1.Exploring fundamental movement patterns in early childhood curriculum

This discussion is a thought experiment. I draw on the local curriculum theory for games of chase as a starting point for contemplating an initial design for exploring fundamental movement patterns (FMP) [Coupled knowledge 12.1] in the early childhood curriculum. This exploration can be viewed as distinct from the exploration of games of chase in this thesis in the sense that they can be viewed as separate projects. At the same time, the two explorations are coupled to each other in the sense that the exploration of FMP emerges from the exploration of games of chase and both are related to the same curriculum domain of physically active play.

Coupled knowledge 12.1: What are fundamental movement patterns (FMP)?

Fundamental movement patterns are patterns of movement associated with fundamental movement skill (FMS), which include basic movement skills such as running, walking, jumping, throwing and kicking, as well as with balancing skills. To explore FMP means exploring the patterns and variations associated with one or more particular skill. For example, exploring running can mean using the same basic pattern of running but in different ways which can include running in different directions (forwards, backwards, sideways), running in pairs, running within a specified boundary, and running lightly (like a fairy) or fast (like a cheetah).

In contemplating this initial design, I ask myself the following questions:

- To what extent are the views of curriculum as structure and as process suitable for this area of exploration? If modifications are necessary, what are they and why are they necessary?
- How can I adapt the view of curriculum as content so that it is an enabling constraint for teaching FMP? What are the few key assumptions and important knowledge in this facet of curriculum? Why are they, and not others, included?

It is unlikely that the initial design will be fully articulated although it is important that it is sufficiently articulated to (1) include identification and justification of any necessary proscriptions and (2) make visible the values of exploring FMP for children and teachers. It is in the dynamics of exploring FMP that revisions to the initial design will unfold. In

enacting this facet of curriculum and describing the dynamics, I will also need to consider the following questions:

- What are existing conditions at the centre that can contribute towards an enabling constraint? What other conditions do I have to create?
- What are some of the teaching methodologies that emerge from and contribute to the design and the dynamics?
- To what extent are the teaching, curriculum and learning stories useful as tools to describe the dynamics? Can or should the forms of these stories be adapted and if so, how and why?

Thus, by drawing on the local curriculum theory for games of chase and adapting it for exploring FMP, it is possible for me, as a teacher, researcher and/or curriculum designer, to create a local curriculum theory for FMP. Both curriculum theories will be simultaneously different from and similar to each other.

12.5. Contributions to knowledge in relation to curriculum

Begg (2008) articulates a challenge in relation to developing a complex curriculum that includes multiple levels of complexity and multiple co-emerging influences. He writes

> "How a complex curriculum might ideally be developed is not clear. Whether acknowledged or not, the process is evolutionary, development will vary from one educational environment to another." (p. 215)

I do not believe in an ideal curriculum, nor do I believe in an ideal way of developing or creating curriculum. I do, however, acknowledge the evolutionary and context-dependent nature of curriculum development. I argue that this thesis demonstrates one example of how a complex curriculum, in the form of the local curriculum theory for games of chase, was developed. This complex curriculum can be seen as a curriculum for emergence. Furthermore, I argue that the development of this complex curriculum was supported by and contributed to a conceptual understanding of a complex curriculum from the perspective of complexity thinking; this conceptual understanding emerged in the form of the concept of local curriculum theory. These two arguments imply that a teacher can create his/her own complex curriculum by focusing on coupling the processes of creating and understanding, doing and reflecting, practising and theorising, and doing so in ways that are consistent with complexity thinking. In the process, he/she can also learn about the nature of the complex curriculum he/she is creating.

In addition, this thesis shows how I created a personal curriculum vision by articulating the local curriculum theory for games of chase and the concept of local curriculum theory. I argue that (1) this thesis has demonstrated a way of creating a personal curriculum vision that embodies one's own identity as a teacher, and (2) the process of curriculum envisioning involves articulating a local curriculum theory for a particular activity or curriculum domain as well as a conceptual understanding of local curriculum theory. I argue that creating a personal curriculum vision that embodies complexity is a valid and meaningful way for teachers to engage in professional learning. At the same time, personal curriculum envisioning contributes to the diversity of curriculum visions in the complex world of teaching and learning.

Chapter 13
Reflections, evaluation and conclusion

Chapter 13 is an element of Thread 1: Research methodology and design. It reflects on the research methodology, problematises the thesis and summarises it.

Summary: In this chapter, I

- reflect on the emergent methodology and conceptualise an understanding of emergent methodology,
- reflect on the Visual Summary,
- problematise five aspects of the thesis,
- summarise the thesis.

13.1. Reflecting on and conceptualising the emergent methodology

Looking back on the thesis that has unfolded, there have been two different but coupled explorations, that is, a curriculum-related exploration (Threads 2, 3 and 4) and a methodology-related exploration (Thread 1). To put it differently, this thesis has explored how I used complexity thinking to foster emergence in both early childhood curriculum and practice-based research. Although the methodology-related exploration played a supporting role [1.5.3], it can, nonetheless, be seen as an exploration in its own right.

This methodology-related exploration focused on creating an emergent methodology by intentionally weaving complexity thinking in the research methodology and design. There were a number of factors that influenced this decision. Firstly, I had a sense that this act of weaving could enable me to learn more about complexity thinking since both the substantive and methodological facets of the thesis would be underpinned by the same discourse but be different in their focus. Secondly, I wanted to present the thesis report in a way that was coherent and yet showed the messiness associated with an emergent methodology [1.4]. Thirdly, I wanted to strive for a thesis that was methodological in order to increase its coherence and persuasiveness [1.5.2].

This methodological exploration has given rise to a number of strategies that addressed various aspects of research methodology and design:

- The strategies to present a thesis report that is methodological in ways that are consistent with the two features of complexity thinking [1.5.2],
- The data collection, generation and management strategy [Chapter 5],
- The data analysis, interpretation and (re)presentation strategy [Chapter 6],
- The strategy for dealing with ethical issues [Chapter 7].

Here I use the word strategy to mean actions and/or ideas that embody a purpose and relationships with the contexts of those actions and/or ideas. This notion of strategy emerges from the root word “strategos” which means “the thinking and actions of a general” (Patton, 2002, p. 37). I argue that these strategies are loosely-coupled to each other in the sense that each has its own purpose(s) while being constrained by the overall purpose of weaving complexity thinking in the research methodology and design. This loose coupling of purposes has been useful because it enabled my methodology and design to be guided by a common purpose at the same time that it gave me the freedom to create my own methods. Thus, the loose coupling of purposes can be seen as an enabling constraint [3.5].

I also argue that by grounding the methodology in complexity thinking, with its focus on being attentive to couplings that exist in teaching and research as well as its focus on expanding possibilities in ways that are ethical and meaningful for individuals and collectives [1.3], it is possible to conceptualise an emergent methodology as a methodology *for* emergence. A methodology for emergence focuses on intentionally occasioning emergence in research while simultaneously valuing unintended emergence; this is consistent with the notion of emergent methodology articulated in this thesis [1.4]. The presence of an intention to occasion emergence brings forth the image of an emergent methodology in which the researcher actively strives to foster emergence, as opposed to merely letting emergence happen. Furthermore, by drawing upon the concept of a local curriculum theory [12.3.4], I tentatively suggest that an emergent methodology is brought forth in the coupling of designed and enacted facets of methodology and is local to a particular research project.

The emergent methodology that unfolded in this thesis began with and grew from initial understandings of complexity thinking [1.3], methodology [1.4] and emergent methodology [1.4]. However, the emergent methodology also shares and/or draws from features of two other emergent approaches, that is, design-based research [13.1.1] and self-study research [13.1.2].

13.1.1. The emergent methodology and design-based research

Drawing on Wang and Hanafin (2005) and Joseph (2004), the emergent methodology shares the following features of design-based research:

- It was a systematic but flexible methodology aimed at improving educational practice.
- It involved implementing an educational intervention at a particular setting and embodied goals related to research, design and pedagogical practices.
- It involved collaboration between practitioners (teachers), children and myself in my role as teacher, researcher and curriculum designer.
- It was driven by theory, was contextually-sensitive and aimed to refine theory and improve practice.
- It involved iterative cycles of designing, developing and implementing.

In this thesis the coupled roles of teacher, researcher and curriculum designer were similar to the roles Joseph (2004) took in her design-based research project where she had the responsibility for design, research and practice. I agree with her that taking on the coupled

roles afforded me "easy access to the ways that design as embodied in practice interacts with research needs" (p. 236).

I decided to take on the triple role instead of the dual role of a teacher-researcher so that I could create a curriculum design for playing games of chase with children. This intention can be regarded as a means by which I could fulfill a promise to Sport and Recreation New Zealand (SPARC), from whom I had successfully applied for funding. I had promised that I would present findings that could benefit the wider early childhood community in ways that were meaningful to the community.

13.1.2. The emergent methodology and self-study research

Drawing on the notion that self-study research involves the study of one's own practice (Zeichner & Noffke, 2001), I recognise that the emergent methodology in this thesis embodied two different but coupled self-study research projects: (1) a self-study of my practice as a teacher, and (2) a self-study of my practice as a researcher. The self-study projects recognised the roles of teacher-as-practitioner and researcher-as-practitioner, and helped me to understand my practices. At the same time, the projects contributed to my efforts to strive for a methodological thesis [13.1. 1.5.2].

In the teacher self-study, I wanted to focus on understanding the complex nature of teaching and learning, and describing these in ways that went beyond the technical-rationalist approach (Loughran, 1999). Kelly (2009) writes that the teacher's role is central in curriculum because (1) teachers are responsible for their work and the consequences arising from it, and (2) they play a "make or break" role (p. 13) in curriculum-related activities, including those that are imposed by external authorities. Kelly adds that teaching requires the teacher to constantly make decisions and judgments, which resonates with Shulman's (2004) notion that teaching embodies multiple and competing expectations and involves responding to the unpredictable. Thus, understanding my thinking and actions as a teacher and making them visible was part of my responsibility in my role as a teacher. At the same time, it could also contribute to the persuasiveness of the thesis since teaching was an integral part of the thesis exploration.

The researcher self-study emerged from my desire to both improve my practice as an emerging researcher and create an understanding of my own ways of creating knowledge. This desire arose from a number of influences:

- I wanted to extend on what I had learnt from my master's thesis in relation to creating emergent methods (Hussain, 2007) whereby the patterns and variations associated with the methods arise during research. I also wanted to experience and understand the meaning of using an active process to create these methods (Kincheloe, 2001) [6.4.4] and to do this in ways that would draw upon my past experiences in software engineering and programming.
- I wanted to create a flexible and dynamic system for managing my personal knowledge creation because this goal would be consistent with the notions that research is systematic and that this thesis focused on emergence. I believed that understanding the ways I achieved this goal could help me become a better researcher.
- There is a requirement in the thesis report to articulate the strategies for collecting and analyzing data, and for dealing with ethical issues, which resonates with Patton's (2002) assertion that researchers need to analyse and report on their analytical processes. I believed doing a self-study of how I managed my own knowledge creation could help me achieve this, especially given the messiness of an emergent methodology. This belief is consistent with Clough and Nutbrown's (2002) assertion that methodology is our research diary.

13.2. Reflecting on the Visual Summary

I argue that the Visual Summary has emerged as a new tool for understanding and showing the complicit or entangled nature of the curriculum dynamics at the Centre. There are two features of the Visual Summary that support this argument: (1) the co-emergent nature of three levels of the nested system of curriculum, and (2) the knower-knowledge couplings embedded in the episodes of the Visual Summary.

The Visual Summary shows the co-emergent nature of the levels of episode, activity and activity categories in the nested system of curriculum. This co-emergent nature of the three levels is embodied in the complex web of relationships that exists within and across episodes, activities and categories of activity over fourteen weeks [10.2]. I argue that this complex relationship is best described as structural coupling because an element in a particular episode triggered a change in one or more subsequent episodes of the same activity and/or in episodes of a different activity. The curriculum story of how the different activities directly related to games of chase unfolded at the Centre [10.3] traces some of these triggers and changes in terms of patterns, variations and drifts. This story also shows that in many cases, the triggers

emerged in the form of knowers recognizing elements of an episode that were of interest to them and incorporating these elements in subsequent episodes.

The triggers described in the above paragraph can be viewed as knower-knowledge couplings. These knower-knowledge couplings are embedded in many of the episodes in the Visual Summary [10.2, Attachment], thus showing how the nested systems of knowers and knowledge co-emerged with the system of curriculum at the Centre.

On reflection, I have found it easier to create and use the Visual Summary in the thesis exploration than to describe and explain it in the thesis report. Furthermore, in contrast with the RDMS [Chapter 5] which is (re)presented in one chapter, the Visual Summary is found on the DVD, and the descriptions and explanations of the Visual Summary are found in different sections across a number of chapters [6.7, 10.2, 10.4, 12.2, Figure 12.1, 13.2, Appendix D], with each section describing and/or explaining a particular facet of the Visual Summary that aligns with the focus of the chapter. I suggest that by (re)presenting the Visual Summary in this manner in the thesis report, knowledge related to this methodological innovation can appear fragmented and disjointed. However, this manner of (re)presentation emerged from (1) the complex relationship between the curriculum-related exploration and the methodology-related exploration, and (2) the role of the Visual Summary in both the data analysis, interpretation and (re)presentation strategy as well as the local curriculum theory for games of chase [12.2, Figure 12.1]; thus, this fragmented and disjointed nature of (re)presentation counts as an unintended outcome of my explorations with complexity.

13.3. Problematising the thesis

In this section, I identify and discuss five aspects of the thesis that are or can be viewed as problematic while recognising that there are other aspects that may be problematised. The process of problematising the thesis recognises that in an emergent methodology, expanding possibilities in some areas necessarily involves making choices about which paths, patterns and areas to explore at any particular point in time. In choosing to explore certain areas in my thesis, I have chosen not to explore other areas at this time. By problematising aspects of this thesis, I (1) recognise the complexity and complicity inherent in this thesis, (2) acknowledge the limited scope of the thesis, and (3) allude to or open up some possible areas for future explorations.

13.3.1.Problematising the thesis exploration

The thesis exploration has involved doing boundary work that synergises the tensions between depth and breadth in research [6.4.2]. The exploration focused on exploring within and across the following disciplinary fields and discourses: complexity thinking, games in physical education, curriculum and research. It has also involved experiencing and considering a range of other discourses such as play, early childhood education in New Zealand and the discourse at the Centre. The depth and breadth explored in each field or discourse varied and the thesis report is an outcome of multiple synergies explored. For example, the framework for playing games of chase [8.1] emerged from exploring the boundaries between complexity thinking, games, play, early childhood education and the discourse at the Centre.

However, there are a number of issues in doing boundary work as part of the thesis exploration. Firstly, boundary work involves making choices about the areas to explore, and the depth and breadth of the explorations. I have found some of the choices difficult to make, given the wide range of possible areas I could have explored within and across the multiple fields and discourses listed above. For example, I tinkered with exploring the boundaries between play and games, and was tempted to explore this boundary area more deeply. I eventually chose not to do this, deciding instead to stay focused on games in the early childhood curriculum. Thus, in making my choices, there have been other areas not explored in this thesis, areas which may nonetheless be worthy of future exploration.

Secondly, tinkering with methods [6.4.4], as well as with ideas and tools, was an important part of the thesis exploration. There were times when the tinkering process had a big influence on the thesis; the RDMS [Chapter 5] and the Visual Summary [6.7] are two examples of this outcome. However, there were other times when the tinkering did not have a big influence on the thesis. For example, I began reading some of the works of Dewey (1963, 1998, 1902, n.d.), and tinkered with some of his ideas, but eventually chose not to go down the path of linking Dewey's ideas with complexity thinking in the thesis report.

I have found doing boundary work and tinkering deeply satisfying. However, I have also found it useful, even necessary, to be both organised and flexible when engaging in boundary work and tinkering. I compare doing boundary work and tinkering with exploring a terrain that I have not yet explored. By being organised and flexible, I am able to create my own meandering paths and still be able to return to the start or a previous point in the exploration should I choose not to continue going down any particular path. The RDMS has been the

tool I used to record footprints of my meanderings as well as to keep organised and stay flexible in my thesis exploration. I argue that a researcher who chooses to engage in boundary work and tinkering should create his/her own tool to record footprints of his/her explorations.

While the argument for the need to be both organised and flexible is simple, the complexity of this argument emerges when we consider how this can be done in ways that are situated, logical and ethical.

13.3.2.Problematising the framework for playing games of chase

The framework for playing games of chase [8.1] is presented from an adult perspective and focuses on creating a safe but creative environment for children to engage in games of chase. The latter focus counts as an ethical consideration, given my temporary role as a volunteer teacher at the Centre [8.3].

However, by presenting the framework in this manner, the framework can be read as restricting children's freedom to explore the boundaries between reality and pretence, as well as across experiential and emotional states. Based on Vygotsky (1933), Vandenberg (1998) and Fink (1960), I argue that play involves exploring the boundaries between reality and pretence. I also agree with Sutton-Smith (1968) that in playing games, children cross boundaries between experiential states such as risk and security, danger and safety. I argue that they also cross the emotional states associated with these experiential states. Thus, crossing ontological, experiential and emotional states is an important aspect of play, and the emergence of outcomes that restrict these explorations can be problematic.

I acknowledge the possibility that, when using the framework, restrictions of children's exploration of boundaries between reality and pretence may emerge unintentionally in practice. I also suggest that teachers who use this framework need to engage in on-going reflections of emerging or emergent outcomes. Furthermore, I suggest that this alternative reading of the framework emerges from the tension between the nature of games and play, both of which are embodied in the framework [8.1.2]; hence a further exploration of this tension is worth pursuing.

13.3.3.Problematising voices in the thesis

I use the word "voice" here to refer to a knower's perspective(s) and his/her/their capacity to influence the thesis or a particular facet of the thesis. My voice as a teacher, researcher and curriculum designer is clearly visible in the thesis report. On the other hand, I acknowledge

that the children's individual and collective voices in the thesis report are weak in comparison with mine. I also suggest that there is unevenness or differences in the strength of the children's voices in different parts of the thesis report; the strength varies from silence to strong. For example, the children's voices are silent in the (re)presentation of the curriculum design because I chose to explain curriculum design in theoretical terms although the curriculum design co-emerged with curriculum dynamics. On the other hand, the children's perspectives are clearly visible and influential in the following stories at episode or activity level: (1) Rachel's voice in CMC1 [VS: CMC1], (2) Jane's and Patricia's voices in tag2 [VS: tag2], (3) Marcus' voice in the game, *What is the time Mr. Jaguar?* [VS: CH5], (4) the children's voices in making the PowerPoint book [VS: WVP7], and (5) Kay's voice in the story of her learning [11.3].

Despite the weakness of the children's voices in the thesis report, I believe that the children's voices were very strong in the enacted curriculum, which counts as a facet of the thesis exploration. Thus, there appears to be a difference in the strength of the children's voices in the thesis report and exploration, and I recognise that the issues of unevenness and differences in children's voices identified in this section present another opportunity for future exploration.

13.3.4.Problematising ethics in a methodology for emergence

The conceptualisation of the emergent methodology as a methodology for emergence [13.1] suggests that even in the presence of an enabling constraint, the outcomes of emergence cannot be fully anticipated in advance [3.6.1]. This suggestion, in turn, raises the question of how researchers can ensure that the research outcomes are ethical and meaningful for the individual agents and the collective system. This is an important question within complexity thinking which foregrounds ethical responsibility and reflexivity (Davis & Sumara, 2006) because researchers are complicit or entangled in the possibilities that are created or brought forth in the research settings [1.3].

In this thesis, I created and discussed the framework for dealing with ethical issues to address uncertainty as well as ethical tensions and issues [Chapter 7]. While the framework and discussions address the ethical considerations and issues in the thesis, they do not explore the theoretical relationship between ethics and a methodology for emergence; this gap, however, implies a possible area for future exploration.

The above theoretical relationship emerges when we consider that an enabling constraint, in its relationship with the conditions for emergence [3.4, 3.5], connotes a complex network of power relationships among agents, between an agent and the system, as well as between groups of agents and the system. Given the presence of this network of power relationships and the possible tensions that can arise from this network, how can teachers, researchers and/or curriculum designers using a methodology for emergence strive to ensure that the enabling constraint is both dynamic and able to address day-to-day and long-term ethical concerns?

13.3.5.Problematising the thesis report

The decision to use the language and concepts of complexity thinking throughout the thesis report was part of a wider strategy to create a methodological thesis that is consistent with the features of complexity thinking [1.5.2]. In the context of a PhD thesis, where there is an emphasis on clarity and coherence, this decision is both risky and problematic because it can give rise to feelings of confusion and incoherence for the reader if he/she is unfamiliar with the language and concepts. The fragmented and disjointed nature of the way the Visual Summary is (re)presented in this thesis report [13.2] illustrates this problem and risk. However, I believe this decision is a risk worth taking because I believe that making the language and concepts visible is an important part of making the discourse visible.

I draw on Lather (2000) who experimented with a variety of tools in writing to negotiate the tension between writing clearly and troubling the norms of academic writing. However, my purpose for using a variety of tools was to negotiate a different tension, that is, the tension between achieving clarity and coherence in the thesis report on the one hand, and ensuring that the discourse is visible in the report on the other hand. My tools [1.5.5] are different from Lather's. The tools and the report structures [1.5.3, 1.5.4] are related to the strategies [1.5.3] I used to make the discourse more accessible and visible to the reader.

One of the strategies was to inter-mingle the language, features and concepts from complexity thinking with more accessible language. This strategy called upon a number of (re)presentation tools and tactics: (1) blending the more accessible narrative and reflective voices with the explanatory voice that is filled with the language of complexity thinking [1.5.2], (2) using diagrams to illustrate connections and couplings between different entities [1.5.4], and (3) using tables to draw attention to similarities and difference in the descriptions [1.5.4].

Another strategy was to enable the reader to experience the discourse in both direct and vicarious ways by (1) presenting detailed stories that embody complexity and emergence which hopefully trigger some resonance with the reader's own experiences, (2) organising the thesis report structure so that it reflects the nested and coupled relationships prevalent in complexity and emergence [1.5.3], and (3) creating tools to help the reader negotiate the complicity arising from the thesis structure [1.5.4].

13.4. Personal reflections

As I reflect on the ways this thesis exploration has been personally transformative, a few thoughts come to mind. The first is the sense that the exploration has broadened and deepened my understanding about complexity and emergence, especially in relation to teaching, learning and curriculum. Looking back, my first intentional exploration into complexity and emergence began in 2003, when, as part of my master's degree, I created an independent study paper to explore ways complexity could be useful in teaching and learning. That was followed by other explorations all of which involved explorations of complexity in education-related phenomena such as early childhood physical education, teaching, learning and teachers' on-going professional learning. I realise this thesis exploration is no different from these other explorations since it shares the common focus on complexity in another education-related phenomenon, curriculum.

Yet, in some ways, this exploration has been different. It has broadened the scope of my understanding about complexity. I have come to create my own understandings of complexity thinking, curriculum and early childhood physical education. It has also deepened my understanding of emergence and its potential as an important concept in curriculum, teaching and learning. Like a child who has gone through the experience of learning to walk, I have struggled to live in complexity and emergence as well as to talk and write about it. And I have reached a point in my learning where I can say I am reasonably comfortable living and talking about emergence. In the process, it has brought forth seemingly diverse interests in and ideas about early childhood physical education, teaching complexity thinking to students and children at all levels of education, and creating deeper understandings of emergent research methodologies. To borrow Arnold's (1979) notion of physical education as education in, through and about movement, this PhD experience has been an education in, through and about emergence.

13.5. Conclusion

This thesis is an example of how the discourse of complexity thinking can be used to foster emergence in curriculum and practice-based research. It also makes a number of arguments in relation to complexity thinking and games of chase, curriculum, local curriculum theory, curriculum vision and methodology; the arguments in relation to local curriculum theory and curriculum vision are presented as nested within those related to curriculum more generally.

1. In relation to complexity thinking and games of chase, this thesis
   - presents a framework for playing games of chase with children and argues that this framework can be seen as an enabling constraint,
   - shows how the games of chase curriculum unfolded at the Centre.
2. In relation to complexity thinking and curriculum, this thesis
   - shows the emergence of a series of phenomena: a new game, a local curriculum theory for games of chase at the Centre, the concepts of local curriculum theory, curriculum and curriculum dynamics, and a curriculum vision,
   - demonstrates an example of how a complex curriculum, in the form of the local curriculum theory for games of chase, was developed,
   - argues that the above development was supported by and contributed to a conceptual understanding of a complex curriculum in the form of a local curriculum theory,
   - argues that a complex curriculum, as described here, is a curriculum for emergence.
3. In relation to local curriculum theory, this thesis
   - argues that a local curriculum theory can enable teachers and children to explore the depth and breadth of a curriculum domain in ways that (1) are generative and recursive, (2) view curriculum as both a negotiated space for running and patterns created in the running, and (3) value both children's and teachers' interests,
   - argues and shows that the concept of a local curriculum theory provides a fresh way of understanding and creating local curriculum in a teaching and learning setting,

- argues and demonstrates that teachers can enhance descriptions of the enacted curriculum by creating teaching stories, curriculum stories and learning stories.

4. In relation to curriculum vision, this thesis
   - argues that the local curriculum theory is an example of and can be seen as a curriculum vision that is both insightful and forward-looking. It is insightful because it enables and prompts teachers and researchers to consider how they can use complexity thinking to occasion and describe emergence as curriculum develops in their own setting without prescribing how this can be done. It is forward-looking because it focuses on expanding possibilities in teaching, learning and activities but in ways that reflect a consciousness of the past and the present.
   - argues that creating a personal curriculum vision that embodies complexity is a valid and meaningful way for teachers to engage in professional learning,
   - argues that creating a personal curriculum vision contributes to the diversity of curriculum visions in the complex world of teaching and learning.

5. In relation to complexity thinking and methodology, this thesis
   - conceptualises an emergent methodology as a methodology for emergence,
   - argues that a methodology for emergence (1) involves the researcher actively striving to foster emergence in research, (2) is brought forth in the coupling of designed and enacted facets of methodology, (3) is local to a particular research project, and (4) emerges from a loose coupling of strategies,
   - provides an example of a methodology for emergence in the form of the thesis report,
   - argues that the Research Data Management System and the Visual Summary are methodological innovations, and count as emergent tools that supported the methodology for emergence in this thesis,
   - argues that weaving the discourse of complexity in the thesis report enables the reader to talk about and experience the discourse and the emergence of the curriculum-related phenomena and the methodological innovations.

As a discourse or a way of thinking and acting, complexity thinking enables teachers and researchers to be both flexible and organised. Living in complexity means that we need to be flexible to deal with uncertainty and unpredictable outcomes that emerge in the randomness inherent in complexity. However, uncertainty and unpredictability can also give rise to incoherence and confusion. Complexity thinking prompts us to focus on coherence and ways of organising that enable mindful and ethical creativity. It is a useful discourse not just for living in complexity but for thriving in it.

References

Alhadeff-Jones, M. (2008). Three generations of complexity theories: Nuances and ambiguities. *Educational Philosophy & Theory, 40*(1), 66-82.

Arnold, P. J. (1979). *Meaning in movement and education*. London: Heinemann.

Baptiste, I. (2001). Qualitative data analysis: Common phases, strategic differences. *Forum: Qualitative Social Research, 2*(3).

Begg, A.J.C. (2008). *Emerging curriculum*. Rotterdam, The Netherlands: Sense Publishers.

Berry, K. (2006). Research as bricolage: Embracing relationality, multiplicity and complexity. In K. Tobin, & Kincheloe, J. (Ed.), *Doing educational research- A handbook* (pp. 87-115). Rotterdam, The Netherlands: Sense Publishers.

Bogdan, R., & Biklen, S. K. (1998). *Qualitative research for education: An introduction to theory and methods* (3rd ed.). Boston: Allyn and Bacon.

Capra, F. (2003). *The hidden connections: A science for sustainable living*. London: HarperCollins Publishers Ltd.

Carr, M. (2001). *Assessment in early childhood settings: Learning stories*. London: SAGE Publications.

Casti, J. L. (1994). *Complexification: Explaining a paradoxical world through the science of surprise*. New York: HarperCollins.

Chandler, M. A. (2008, 15 April). At McLean School, Playing Tag Turns Into Hot Potato. The Washington Post. http://www.washingtonpost.com/wp-dyn/content/article/2008/04/14/AR2008041402988.html

Christensen, P. I. A., & Prout, A. (2002). Working with ethical symmetry in social research with children. *Childhood, 9*(4), 477.

Clough, P., & Nutbrown, C. (2002). *A student's guide to methodology: Justifying enquiry*. London: SAGE Publications.

Coffey, A., & Atkinson, P. (1996). *Making sense of qualitative data*. London: SAGE Publications.

Coghlan, D., & Brannick, T. (2005). *Doing action research in your own organization* (2nd ed.). London: SAGE Publications.

Cohen, J., & Stewart, I. (1994). *The Collapse of chaos: Discovering simplicity in a complex world*. London: Penguin Books.

Colbert, J. (2006). New forms of an old art-children's storytelling and ICT (Internet and communication technology). *Early Childhood Folio 10*, 2-5.

Collins, S., & Clarke, A. (2008). Activity frames and complexity thinking: Honoring both public and personal agendas in an emergent curriculum. *Teaching & Teacher Education, 24*(4), 1003-1014.

Creswell, J. W., & Miller, G. A. (1997). Research methodologies and the doctoral process. *New Directions for Higher Education*(99), 33.

Crotty, M. (1998). *The foundations of social research: meaning and perspective in the research process*. St Leonards, NSW: Allen & Unwin.

Cutting, B., & Cutting, J. (1988). *A small world*. Auckland: Heinemann Asia.

Danby, S., & Farrell, A. (2004). Accounting for young children's competence in educational research: New Perspectives on Research Ethics. *The Australian Educational Researcher, 31*(3), 35-49.

Davis, B. (2004). *Inventions of teaching: A genealogy*. Mahwah, NJ: Lawrence Erlbaum Associates.

Davis, B. (2008). Complexity and education: Vital simultaneities. *Educational Philosophy & Theory, 40*(1), 50-65.

Davis, B., & Simmt, E. (2003). Understanding learning systems: Mathematics education and complexity science. *Journal for Research in Mathematics Education, 34*(2), 137-167.

Davis, B., & Sumara, D. J. (2006). *Complexity and education : Inquiries into learning, teaching, and research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Davis, B., Sumara, D. J., & Luce-Kapler, R. (2000). *Engaging minds : Learning and teaching in a complex world*. Mahwah, NJ: Lawrence Erlbaum Associates.

Dewey, J. (1902). *The Child and the curriculum* [Project Gutenberg]. Available from http://www.gutenberg.org/ebooks/29259.

Dewey, J. (n.d.). *Democracy and education* [Project Gutenberg]. Available from http://www.gutenberg.org/ebooks/852.

Dewey, J. (1963). *Experience and education*. New York: Collier.

Dewey, J. (1998). *How we think: A restatement of the relation of reflective thinking to the educative process* Boston: Houghton Mifflin.

Dey, I. (1993). *Qualitative data analysis: A user-friendly guide for social scientists*. London: Routledge.

Dodd, L. (1985). *Scattercat*. Wellington: Mallinson Rendel.

Doll Jr, W. E., & Gough, N. (Eds.). (2002). *Curriculum visions*. New York: Peter Lang.

Doll, W. E. (1993). *A post-modern perspective on curriculum*. New York: Teachers College Press.

Doll, W. E. (2008). Complexity and the culture of curriculum. *Educational Philosophy & Theory, 40*(1), 190-212.

Donmoyer, R. (2001). Paradigm talk reconsidered. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed., pp. 174-197). Washington DC: American Educational Research Association.

Eisner, E. (1998). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Eisner, E. (2002). *The educational imagination on the design and evaluation of school programs* (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Elliott, J. (2005). *Using narrative in social research: Qualitative and quantitative approaches*. London: SAGE Publications.

Esposito, J. L. (1995). Play and possibilities. In W. J. Morgan & K. V. Meier (Eds.), *Philosophic inquiries in sport* (2nd ed., pp. 114-119). Champagne, IL: Human Kinetics.

Fink, E. (1960). The ontology of play. In W. J. Morgan & K. V. Meier (Eds.), *Philosophical enquiries in sport* (2nd ed., pp. 100-109). Champaign, IL: Human Kinetics.

Fleener, J. (2002a). *Curriculum dynamics: Recreating heart*. New York: Peter Lang.

Fleener, J. (2002b). Logical foundations for an organocentric curriculum: Dewey's logic and complexity sciences. In W. E. Doll Jr & N. Gough (Eds.), *Curriculum visions* (pp. 152-163). New York: Peter Lang.

Fullan, M. (1999). *Change forces : The sequel*. London: Falmer Press.

Gallahue, D. L., & Donnelly, F. C. (2003). *Developmental physical education for all children*. Champaign, IL: Human Kinetics.

Gough, N. (2002). Voicing curriculum visions. In W. E. Doll Jr & N. Gough (Eds.), *Curriculum visions* (pp. 1-22). New York: Peter Lang.

Graham, G., Holt/Hale, S., & Parker, M. (1998). *Children moving. A reflective approach to teaching physical education*. Mountain View, CA: Mayfield Publishing Co.

Graue, M. E., & Walsh, D. J. (1998). *Studying children in context: Theories, methods, and ethics*: Sage.

Greene, J. C. (2001). Mixing social inquiry methodologies. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed., pp. 251-258). Washington, DC: American Educational Research Association.

Gump, P. V., & Sutton-Smith, B. (1971). The "It" role in children's games. In E. M. Avedon & B. Sutton-Smith (Eds.), *The study of games* (pp. 390-397). New York: John Wiley & Sons Inc.

Hedges, H. (2003). Teaching and learning: Theories that underpin 'wise' practice in Aotearoa/New Zealand. *Early Education, 31*(Autumn), 5-12.

Henry, J. (2001). British bulldogs hold their ground. *Times Educational Supplement*(4439), 5.

Huberman, A.M., & Miles, M.B. (1994). *The Qualitative Researcher's Companion*. Thousand Oaks, CA: SAGE Publications.

Hussain, H. B. (2007). *Managing learning journeys in Active Movement : Developing theories of change in professional development and change.* Unpublished master's thesis, University of Canterbury, Christchurch, New Zealand.

Hutchins, P. (1990). *What game shall we play?* New York: Greenwillow Books.

Johnson, S. (2001). *Emergence: The connected lives of ants, brains, cities and software*. New York: Scribner.

Joseph, D. (2004). The practice of design-based research: Uncovering the interplay between design, research, and the real-world context. *Educational Psychologist, 39*(4), 235-242.

Keirsey, D. M. (1999). Involution: On structure and process of existence. In F. Heylingen, F. Bollen & A. Riegler (Eds.), *The evolution of complexity (Volume 8): The violet book of Einstein meets Margritte* (pp. 45-57). Dordrecht, The Netherlands: Kluwer Academic Publications.

Kelly, A. V. (2009). *The curriculum: Theory and practice* (6th ed.). London: SAGE.

Kincheloe, J. (2001). Describing the bricolage: Conceptualizing a new rigor in qualitative research. *Qualitative Inquiry, 7*(6), 679.

Kincheloe, J. (2005). On to the next level: Continuing the conceptualization of the bricolage. *Qualitative Inquiry, 11*(3), 323.

Kincheloe, J., & Berry, K. (2004). *Rigour and complexity in educational research: Conceptualizing the bricolage*. Maidenhead: Open University Press.

Kirchner, G., & Fishburne, G. J. (1998). *Physical education for elementary school children* (10th ed.). Boston, MA: WCB/McGraw Hill.

Kliebard, H. M. (1982). Curriculum theory as metaphor. *Theory into Practice, 21*(1), 11-17.

Koskinen, K. U. (2009). Project-based company's vital condition: Structural coupling. An autopoietic view. *Knowledge and Process Management, 16*(1), 13-22.

Kretchmar, R. S. (2005). *Practical philosophy of sport and physical activity*. Champaign, IL: Human Kinetics.

Kridel, C. A. (Ed.). (2010). *Encyclopedia of curriculum studies*. Thousand Oaks, CA: SAGE Publications.

Lather, P. (2000). Drawing the lines at angels: Working the ruins of feminist ethnography. In E. A. St. Pierre & W. S. Pillow (Eds.), *Working the ruins: Feminist poststructural theory and methods in education* (pp. 284-313). New York: Routledge.

Lee, S. S., & van den Berg, O. (2003). Ethical obligations in teacher research. In A. Clarke & G. Erickson (Eds.), *Teacher inquiry: Living the research in everyday practice* (pp. 93-102). New York: Routledge.

Lee, W., Hatherley, A., & Ramsey, K. (2002). Using ICT to document children's learning. *Early Childhood Folio, 6*, 10-16.

Lemke, J. L., & Sabelli, N. H. (2008). Complex systems and educational change: Towards a new research agenda. *Educational Philosophy & Theory, 40*(1), 118-129.

Lipton, L. (2003). Big fight on the playground. *Wall Street Journal - Eastern Edition, 242*, W1-W4.

Loughran, J. (1999). Researching teaching for understanding. In J. Loughran (Ed.), *Researching teaching: Methodologies and practices for understanding pedagogy* (pp. 1-9). London: Falmer Press.

Mata-Toledo, R. A., & Cushman, P. K. (2000). *Schaum's outline of fundamentals of relational databases*. New York: McGraw-Hill.

Maturana, H., & Varela, F. (1998). *The tree of knowledge: The biological roots of human understanding* (2nd ed.). Boston, MA: Shambhala Publications Inc.

Meyer, H. D. (2002). The new managerialism in education management: Corporatization or organizational learning? *Journal of Educational Administration, 40*(6), 534-551.

Ministry of Education. (1996). *Te Whāriki : He whāriki matauranga mo nga mokopuna o Aotearoa : Early childhood curriculum*. Wellington, N.Z.: Learning Media.

Ministry of Education. (2002). *Pathways to the future: Ngā huarahi arataki. A 10-year strategic plan for early childhood education 2002-2012*. Retrieved June 6, 2008, from http://www.minedu.govt.nz/educationSectors/EarlyChildhood/ECEStrategicPlan/PathwaysToTheFutureEnglishPlanAndTranslations.aspx.

Ministry of Education. (2004). *Kei tua o te pae: Assessment for learning: Early childhood exemplars.* Wellington: Learning Media.

Ministry of Education. (2007a). *Funding handbook*. Retrieved Aug 26, 2008, from http://www.lead.ece.govt.nz/Funding/FundingHandbook/default.htm.

Ministry of Education. (2007b). *State of education in New Zealand 2007*. Retrieved June 6, 2008, from http://www.educationcounts.govt.nz/publications/ece/2551/17097.

Morris, G. S. D., & Stiehl, J. (1999). *Changing kids' games* (2nd ed.). Champaign, IL: Human Kinetics.

Mosekilde, E. (1996). *Topics in nonlinear dynamics: Applications to physical, biology and economic systems*. Singapore: World Scientific.

Nees, G. (2000). Growth, structural coupling and competition in kinetic art. *Leonardo, 33*(1), 41-47.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company*. New York: Oxford University Press.

Nuttall, J. (2005). Educators and children learning together: Reflections on the early childhood assessment examplars. *Early Education, 38*(Spring/Summer), 63-72.

Orton, J. D., & Weick, K. E. (1990). Loosely coupled systems: A reconceptualization. *Academy of Management Review, 15*(2), 203-223.

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3 ed.). Thousand Oaks, CA: Sage Publications.

Putnam, R. T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? In B. Moon, J. Butcher & E. Bird (Eds.), *Leading professional development in education* (pp. 11-29). London: RoutledgeFalmer.

Ramsey, K., Sturm, J., Breen, J., Lee, W., & Carr, M. (2007). Weaving ICTs into Te Whāriki at Roskill South Kindergarten. In A. Meade (Ed.), *Cresting the waves: Innovation in early childhood education* (pp. 29-36). Wellington: NZCER Press.

Robson, C. (1993). *Real world research* (7th ed.). Malden, MA: Blackwell Publishers.

Sagor, R. (2005). *The action research guidebook : A four-step process for educators and school teams*. Thousand Oaks, CA: Corwin Press.

Shulman, L. (2004). *The wisdom of practice: Essays on teaching, learning and learning to teach*. San Francisco: Jossey-Bass.

Steven-Smith, D. (2004). Teaching spatial awareness to children. *JOPERD: The Journal of Physical Education, Recreation & Dance, 75*(6), 52-56.

Stewart, I. (2007). Complicity and simplexity. *Complicity: A International Journal of Complexity and Education, 4*(1), 105-106.

Sutton-Smith, B. (1968). Games-playday-dreams. *Quest, 10*, 47-58.

Taylor, M.C. (2001). *The moment of complexity: Emerging network culture.* Chicago: The University of Chicago Press.

Terzidis, K. (2007). The etymology of design: Pre-Socratic perspective. *Design Issues, 23*(4), 69-78.

Traer, R. (2009). *Doing environmental ethics*. Boulder, CO: Westview Press.

Vandenberg, B. (1998). Real or not real: A vital developmental dichotomy. In O. N. Saracho & B. Spodek (Eds.), *Multiple perspectives on play in early childhood education* (pp. 295-305). New York: State University of New York Press.

Vygotsky, L. S. (1933). Play and its role in the mental development of children. In J. S. Bruner, A. Jolly & K. Sylva (Eds.), *Play-Its role in development and evolution* (pp. 537-554). New York: Basic Books Inc Pub.

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *ETR&D, 53*(4), 5-23.

Weick, K. E. (1976). Educational organizations as loosely coupled systems. *Administrative Science Quarterly, 21*, 1-19.

Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business School Press.

Wolcott, H. F. (1994). *Transforming qualitative data: Description, analysis, and interpretation*. Thousand Oaks, CA: SAGE Publishing Inc.

Young, V. M. (2006). Teachers' use of data: Loose coupling, agenda setting, and team norms. *American Journal of Education, 112*(4), 521-548.

Zeichner, K. M., & Noffke, S. E. (2001). Practitioner research. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed., pp. 298-330). Washington DC: American Educational Research Association.

Appendix A
Te Whāriki principles, strands and goals

The principles, strands and goals are from the curriculum document (Ministry of Education, 1996) and are summarised below.

Table A1: Te Whāriki (Ministry of Education, 1996) principles, strands and goals

Te Whāriki principles			
Empowerment *Whakamana*	**Holistic Development** *Kotahitanga*	**Family and Community** *Whānau tangata*	**Relationships** *Ngā hononga*

Te Whāriki strands and goals				
Well-being	**Belonging**	**Contribution**	**Communication**	**Exploration**
The health and well-being of the child are protected and nurtured. Goals: Children experience an environment where: • their health is promoted; • their emotional well-being is nurtured; • they are kept safe from harm.	Children and their families feel a sense of belonging. Goals: Children and their families experience an environment where: • connecting links with the family and • the wider world are affirmed and extended; • they know that they have a place; • they feel comfortable with the • routines, customs, and regular events; • they know the limits and boundaries of acceptable behaviour.	Opportunities for learning are equitable and each child's contribution is valued. Goals: Children experience an environment where: • there are equitable opportunities for learning, irrespective of gender, ability, age, ethnicity, or background; • they are affirmed as individuals; • they are encouraged to learn with and alongside others.	The languages and symbols of their own and other cultures are promoted and protected. Goals: Children experience an environment where: • they develop non-verbal communication skills for a range of purposes; • they develop verbal communication skills for a range of purposes; • they experience the stories and symbols of their own and other cultures; • they discover and develop different ways to be creative and expressive.	The child learns through active exploration of the environment. Goals: Children experience an environment where: • their play is valued as meaningful learning and the importance of spontaneous play is recognised; • they gain confidence in and control of their bodies; • they learn strategies for active exploration, thinking, and reasoning; • they develop working theories for making sense of the natural, social, physical, and material worlds.

Appendix B
Aspects of Research Data Management System

This appendix shows aspects of the Research Data Management System mentioned in Chapter 5. Table B1 shows the details of data collected and generated in terms of data type, equipment used to collect the data, physical location of data and system for labeling data. Table B2 shows the system used to label and reference data in the databases.

Table B1: Details of data type, equipment used, physical location and system for labeling data

ID	What do I call this data?	Equipment used	Where can I find this data?	How do I name this data?
1	audiorecordings	mp3 player	AT THE CENTRE\raw data	yymmdd - name - mp3
2	videorecordings	Panasonic, Sony	AT THE CENTRE\raw data	yymmdd - name - s(n)[- description], yymmdd - name - p(n)[- description]
3	photos	Pentax	AT THE CENTRE\raw data	yymmdd - name(n)
4	photos	ImageMixer	AT THE CENTRE\converted photos	yymmdd - name - IM
5	BS journal	Pentax	AT THE CENTRE\BS JOURNAL	yymmdd - big side journal (n)
6	fieldnotes	scrapbook	PhD13-PhD19, Outlook journal documents	ddmmyy-nn subject
7	summmary fieldnotes	Outlook 2007	Outlook journal documents	subject
8	children's learning stories	Outlook 2007, Powerpoint 2007, Word 2007	AT THE CENTRE\STORIES	yymmdd - title
9	Powerpoints	Powerpoint 2007	AT THE CENTRE\STORIES	yymmdd title
10	movies	WMM	AT THE CENTRE\MOVIE PROJECTS	title
11	research newsletters & updates	Word 2007	AT THE CENTRE\RESEARCH NEWSLETTERS & UPDATES	weekly newsletter yymmdd
12	teacher's learning stories	Word 2007	AT THE CENTRE\STORIES\from jewels	title

Table B2: System for labeling and referencing data in the databases (continued on next page)

ID	What do I call this data?	Reference code	How is the data referenced in the database	Which database is this data recorded?	Is this data generated, collected or both?	Notes
1	audiorecordings	RD	RDyymmdd-nn	raw data files table	collected	I attached an mp3 player on my waist to record conversations. There are generally two mp3 recordings, one for the activities/events before am tea and one after am tea. The recordings were downloaded to my laptop during morning tea and in the afternoons.
2	videorecordings	RD	RDyymmdd-nn	raw data files table	collected	I used two video cameras. One was a Panasonic HDD which was attached to a tripod and placed in a specific location. The other was a Sony DVD camera which David held in his hand. The recordings were downloaded to my laptop at morning tea and in the aft.
3	photos	RD	RDyymmdd-nn	raw data files table	collected	I carried the camera with me in a waist pouch so that I could take photos when the opportunity/need arose. The photos were downloaded in the afternoons.
4	photos	RD	not recorded	not recorded	generated	These were photos that were generated from the video recordings. I used them for learning stories, Powerpoints, newsletters and movies.
5	BS journal	RD	RDyymmdd-nn	raw data files table	both	I generated the journal entry when I wrote it and later collected it when I took photos of it; actual journal was left at the Centre

6	fieldnotes	OJ, PhD	OJyymmdd - hhmm - subject, PhDnn/yymmdd-nn/subject	Outlook folders 0901-0902 & 0903-0904, PhDnn	generated	I carried my scrapbook with me at all times and recorded during am tea, at/after mat times and at other opportune times. Copies of data recorded in following Outlook journal folders: PhD13-18, summary fieldnotes & Big Side journal entries
7	summmary fieldnotes	OJ, SF	OJyymmdd - hhmm - subject, SFyymmdd	Outlook folders 0901-0902 & 0903-0904, summary fieldnotes	generated	I created the summary fieldnotes in the afternoons based on the fieldnotes and memories of the morning's events/activities
8	children's learning stories	DF, OJ	DFnn, OJyymmdd - hhmm - subject	documents created during fieldwork table	generated	
9	Powerpoints	DF	DFnn	documents created during fieldwork table	generated	
10	movies	DF	DFnn	documents created during fieldwork table	generated	
11	research newsletters & updates	DF	DFnn	documents created during fieldwork table	generated	I created these on Wednesdays to share with the Centre community. The newsletters were uploaded them to Moodle and only parents who were had access to my site could access them. The updates were incorporated as part of the Centre's newsletter.
12	teacher's learning stories	DC	DCnn	documents collected during fieldwork table	collected	I collected these from a teacher, whom I knew had written some learning stories for the children's learning journals.

Appendix C
Information letters and consent forms

This appendix contains the information letters and consent forms that were distributed to children, parents and teachers at the Centre. Please note that the title in all these letters and forms include references to silliness and laughter. This was another facet of early childhood curriculum that I initially intended to explore. However, when I realised that there was enough in the exploration of games of chase to create a thesis, I decided to not to pursue this area of exploration.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Information for the Children

Dear _____,

Hello, kia ora. My name is Hanin and I used to be a teacher in the Big Side. I am now doing research at the University. Doing research means finding out and learning more about something and I am learning more about children like you playing chasing games, being silly and laughing.

I will be coming back to teach at the Big Side for about three months. While I am here, I will teach you to play chasing games, do silly and funny activities, and join in other activities with you and your teachers. I will also be talking with you about your ideas so we can make up games and activities together and learn about them. You can choose when you want to join in the games and activities and when you want to stop playing.

I will be taking videos and photos of us playing together. We will watch the videos of ourselves and our friends playing and we will talk about what we did. I will also record what we talk about so we can listen to what we said. I also want use the videos, photos and talking to help me remember what we did and said. You can let me know when you want to be in the video and when you don't want to be in it. You can also let me know when you want or don't want to have your photo taken. You can let me know when you want me to record what you say and when you don't want me to do this.

I will write stories of what we do together and what we learn from them. Some of these stories will go in your profile book. I will share some stories with your family, your friends and their families. I will also share some stories with other people you don't know, but I will use special names in these stories.

I have given your parents/caregivers a letter to explain what I am doing. If you have any questions about my research, you can talk to your parents or caregivers or to Michelle. You can also ask me any questions when I am at the centre.

Thank you for helping me with my research. I am looking forward to coming back the Big Side to play and learn with you.

Signed: _____ Date: _____

Hanin Hussain, University of Canterbury College of Education

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1. *This project has received ethical approval from the University of Canterbury College of Education Ethical Clearance Committee.*
2. *Complaints may be addressed to:*
   Dr Missy Morton, Chair, Ethical Clearance Committee
   College of Education, University of Canterbury
   Private Bag 4800, CHRISTCHURCH *Telephone: 345 8312*

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Playing tag with curriculum and research: Using complexity thinking to explore silliness, laughter and games of chase in the early childhood curriculum

Information for Parents/Caregivers/Whānau

Kia ora

My name is Hanin. I used to be a teacher in the Big Side, and I am now a PhD student at the University of Canterbury College of Education. I am researching how a teacher-researcher can use complexity thinking in early childhood curriculum and research, with a focus on two aspects of the curriculum, namely games of chase and activities with silliness and laughter. There is very little research on games of chase and silliness and laughter in early childhood settings, and the new knowledge that will be created can contribute to children's and teachers' lives in these settings.

To explore complexity thinking in early childhood curriculum and research, I will be coming to the centre as a volunteer teacher for about three months. During this time, I will join in the activities at the centre. I will also be exploring with the children games of chase and activities with silliness and laughter. At the same time, I will be collecting data for my teaching and my research.

Teaching at the centre

As a teacher, I will participate in activities, as well as observe and take photographs, videos and audiorecordings during activities. I will share with the teachers and children some of the photographs, videos and audiorecordings and also talk with them about what we/they did and learnt and record these too. I may also approach you to talk with you informally about your child and collect some of the stories that other teachers have written about your child. I will use all this information to create stories of activities, children's learning and/or my learning. Some of the photographs and stories will be put in your child's learning journal. Some will be shared with the centre community. All these will be done in line with the centre's practices and policies.

Researching at the centre

As a researcher, I will also use the above data and stories to create my PhD thesis and other research publications. I will change your child's name in the thesis and other publications that I create for sharing beyond the centre community so that your child's and your identities remain confidential. I will use photographs and/or video clips of your child for these research publications only if you have given me permission to do so. I wish to inform you that, should you give me permission to use photographs and video clips of your child for these purposes, I will not be able to keep his/her identity confidential. However, I give my assurance that any information, photographs and videos collected in this research will be used for educational purposes only. All data will be stored either digitally or in a locked filing cabinet in my office for a period of five years.

---

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CHRISTCHURCH NEW ZEALAND

What happens if you decide not to let your child participate in the research or decide to withdraw your child from the research?

Participation in the research is voluntary, and you may also withdraw your child from the research at any time. You may also withdraw any information, photographs, videos and stories pertaining to you and your child. In all cases, I assure you that you and your child will not be penalised for not participating in the research.

I may still create learning stories about your child as part of my teaching role, even if you choose not to participate in or to withdraw from the research. However, these stories will not be used in my research. If your child features in any photographs or video clips taken in a group setting, his/her face will be digitally masked so that he/she is not identifiable.

What to do next?

Please sign the attached consent form if you agree for your child to take part in the research and indicate the ways in which you agree to participate. If you have any questions about this project, please feel free to talk with me or with my supervisor, Dr Lindsey Conner. Lindsey can be contacted at 345 8463. If you have any complaints, you may also contact the Chair of the University of Canterbury Ethics Committee; see contact details below.

I strongly believe that this research can contribute to your child's learning in the Big Side. I appreciate your thinking about helping me in my research, and I very much look forward to coming back to the Big Side. Thank you.

Signed: _____ Date: _____

Hanin Hussain, University of Canterbury College of Education

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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Exploring silliness, laughter and games of chase in the early childhood curriculum

Parent/Caregiver/Whanāu Consent Form

I have read and understood the information given to me about the teaching and the research. On that basis, I give permission for you to do the following (in addition to normal teaching practices at the centre):

- Collect and use stories involving my child for sharing *within* the centre community **Yes/No***
- Collect and use audiorecordings involving my child for sharing *within* the centre community **Yes/No***
- Collect and use my child's photographs for sharing *within* the centre community **Yes/No***
- Collect and use video recordings of my child for sharing *within* the centre community **Yes/No***
- Collect and use stories involving my child for the thesis and any publications *outside* the centre community **Yes/No***
- Collect and use audiorecordings involving my child for the thesis and any publications *outside* the centre community **Yes/No***
- Collect and use my child's photographs for the thesis and any publications *outside* the centre community **Yes/No***
- Collect and use video recordings of my child for the thesis and any publications *outside* the centre community **Yes/No***
- Record our informal conversations **Yes/No***

I understand that should I not give you permission to do any of the above, any reference to me and/or my child in photographs, videotapes and audiorecordings taken in a group setting will be removed or digitally masked out.

I understand that my child's identity and any information pertaining to me and my child will be kept confidential when it is not relevant to normal teaching practices at the centre. I also understand that all information will be used for educational purposes only. Furthermore, I may withdraw my child from the research at any time and/or withdraw any information pertaining to me and my child without any repercussions.

Child's Name: _____

Parent's Name: _____ Date: _____

Parent's Signature: _____

Please circle your choice.

Please return this form to Hanin or Mona.

---

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UNIVERSITY OF CANTERBURY
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Playing tag with curriculum and research: Using complexity thinking to explore silliness, laughter and games of chase in the early childhood curriculum

Information for Teachers

Kia ora

My name is Hanin. I used to be a teacher in the Big Side, and I am now a PhD student at the University of Canterbury College of Education. I am researching how a teacher-researcher can use complexity thinking in early childhood curriculum and research, with a focus on two aspects of the curriculum, namely games of chase and activities with silliness and laughter. There is currently very little research into games of chase and silliness and laughter in early childhood settings, and the new research that will be created from this research can contribute to children's and teacher's lives in these settings.

To explore complexity thinking in early childhood curriculum and research, I will be coming to the centre as a volunteer teacher for about three months. During this time, I will join in the activities at the centre. I will also be exploring with the children games of chase and activities with silliness and laughter. You are most welcome to join me in these explorations. At the same time, I will be collecting data for my teaching and my research.

Teaching at the centre

As a teacher, I will participate in activities, as well as observe and take photographs, videos and audiorecordings during activities. I will share with you and the children some of the photographs, videos and audiorecordings and also talk with you and the children about what we/they did and learnt, and record these too. I would also like to collect some of the stories that you have written about some of the children. I will use all this information to create stories of activities, children's learning, my learning and/or our learning as teachers. Some of the photographs and stories will be put in children's learning journals and some will be shared with the centre community. All these will be done in line with the centre's practices and policies.

Researching at the centre

As a researcher, I will also use the above data and stories to create my PhD thesis and other research publications. I will change your name in the thesis and other publications that I create for sharing beyond the centre community so that your identity remains confidential. I will use photographs and/or video clips of you for these research publications only if you have given me permission to do so. I wish to inform you that, should you give me permission to use your photographs and video clips for these purposes, I will not be able to keep your identity confidential. However, I give my assurance that any information, photographs and videos collected in this research will be used for educational purposes only. All data will be stored electronically or in a locked filing cabinet in my office for five years.

---

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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

What happens if you decide not to participate in the research or decide to withdraw from the research?

Participation in the research is voluntary, and you may also withdraw from the research at any time. You may also withdraw any information, photographs, videos and stories pertaining to you at any time. In all cases, I assure you that you will not be penalised in any way for not participating in the research.

I may still create teaching stories involving you as part of my teaching role, even if you choose not to participate in the research or to withdraw from it. However, any references to you in these stories will be removed in my research. If you feature in any photographs or video clips taken in a group setting, your face will be digitally masked so that you are not identifiable.

What to do next?

Please sign the attached consent form if you agree to take part in the research and indicate the ways in which you agree to participate. If you have any questions about this project, please feel free to talk with me or with my supervisor, Dr Lindsey Conner. Lindsey can be contacted at 345 8463. If you have any complaints, you may also contact the Chair of the University of Canterbury Ethics Committee; see contact details below.

I strongly believe that this research can contribute to teaching and learning at the centre. I appreciate your thinking about helping me in my research, and I very much look forward to coming back to the Big Side. Thank you.

Signed: _____ Date: _____

Hanin Hussain, University of Canterbury College of Education

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Exploring silliness, laughter and games of chase in the early childhood curriculum

Teacher Consent Form

I have read and understood the information given to me about the teaching and the research. On that basis, I give permission for you to do the following (in addition to normal teaching practices at the centre):

- Collect and use stories involving me for sharing *within* the centre community **Yes/No***
- Collect and use audiorecordings involving me for sharing *within* the centre community **Yes/No***
- Collect and use my photographs for sharing *within* the centre community **Yes/No***
- Collect and use video recordings of me for sharing *within* the centre community **Yes/No***
- Collect and use stories involving me for the thesis and any publications *outside* the centre community **Yes/No***
- Collect and use audiorecordings involving me for the thesis and any publications *outside* the centre community **Yes/No***
- Collect and use my photographs for the thesis and any publications *outside* the centre community **Yes/No***
- Collect and use video recordings of me for the thesis and any publications *outside* the centre community **Yes/No***
- Record our conversations **Yes/No***
- Collect documents and/or stories I create **Yes/No***

I understand that should I not give you permission to do any of the above, any reference to me in photographs, videotapes and audiorecordings taken in a group setting will be removed or digitally masked out.

I understand that my identity and any information pertaining to me will be kept confidential when it is not relevant to normal teaching practices at the centre. I also understand that all information will be used for educational purposes only. Furthermore, I may withdraw from the research at any time and/or withdraw any information pertaining to me without any repercussions.

Name: _____ Date: _____

Signature: _____

Please circle your choice.

Please return this form to Hanin.

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1. *This project has received ethical approval from the University of Canterbury College of Education Ethical Clearance Committee.*
2. *Complaints may be addressed to:*
   a. *Dr Missy Morton, Chair, Ethical Clearance Committee*
   b. *College of Education, University of Canterbury*
   c. *Private Bag 4800, CHRISTCHURCH* *Telephone: 345 8312*

Appendix D
Specifications and technical issues related to the Visual Summary

Appendix D contains information on the technical aspects of the Visual Summary. The following aspects of the Visual Summary are described and/or explained in other sections:

- The features of the Visual Summary are described and explained in Section 10.2.
- The story of how the Visual Summary emerged is described in Section 6.7
- A discussion of the Visual Summary is in Section 12.2].

D.1. How to play the Visual Summary

To play the Visual Summary on the computer,

- Insert the DVD into the DVD drive.
- When the DVD is loaded, open the DVD drive folder. It will show the contents of the DVD; Figure D1 shows the contents when opened on a Windows computer.

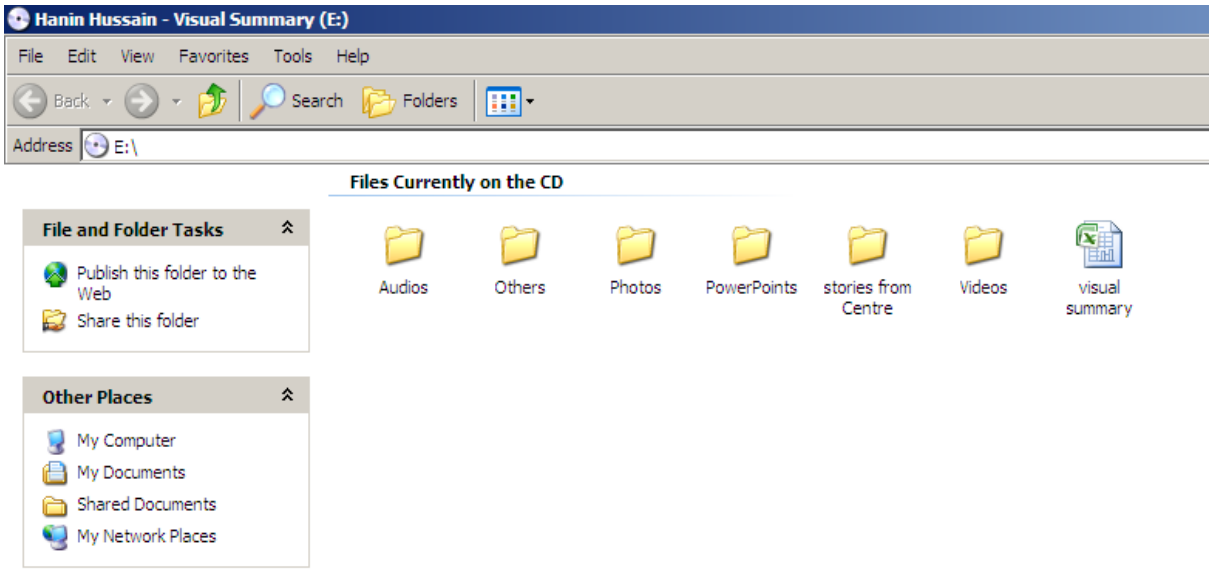

Figure D1: Folders and file on the Visual Summary DVD

- Click on the file "visual summary".
- There may be issues with opening some of the embedded files in the Visual Summary. Please refer to Table D1 for important notes and possible technical issues associated with playing the DVD.
- When playing a movie file, a silent break in the sound may mean that I have edited or masked out one or more names of children and/or teachers.

D.2. Specifications for creating the Visual Summary DVD

This Visual Summary was created using Microsoft (MS) Excel 2007. The Visual Summary and the associated files were burned as data using the following specifications or settings:

- DVD: Verbatim DVD-R (4.7 GB, 16x speed, 120 min)
- Software: Sonic DigitalMedia Plus v7 with maximum target burn speed of 8.0x
- Hardware: Mashita DVDRW DL drive
- Total file size of DVD: 2.3GB

D.3. Specifications for the embedded files in the Visual Summary

Table D1 classifies the types of embedded files, the file format(s) for each type of embedded file, the tool(s) used to create them, as well as some important notes and technical issues associated with playing/opening these files.

Table D1: Types of embedded files, their file formats in the Visual Summary, the tool(s) used and important notes

Type of embedded file	File format(s) for embedded file type	Tool(s) used to edit and/or create the embedded files	Important notes and possible technical issues
Movie files	avi, mpg1, mpg2, wmv	• Movie files with avi and wmv file formats required masking of faces and names, and were created using Adobe Premiere Elements 2.0. • Movie files with mpg1 and mpg2 did not require any masking or required masking of only names, and were created using ImageMixer1.5.	All the movie files were played on Windows Media Player 11 without problems. However, I have encountered some technical problems with some of the files when I played them on QuickTime Player or Real Player.
Text files	docx	MS Word 2007	• All files opened with MS Word 2007. • In some cases, the text file opened with an error message related to the Add-in program, Endnote, which I used as my referencing software. By clicking OK on the message, I was able to read the text files. • The hyperlinked files in the text files could not be opened when read on an Apple Macintosh platform.

Photos	jpg	• Photos that required masking of faces were edited using a combination of MS Powerpoint 2007 and ACDSee for Pentax 3.0. • Photo that required masking of names or addition of texts were edited using MS Powerpoint 2007.	The photos opened successfully on Internet Explorer and Picasa. I did not encounter any problems opening the photos.
Sound file	mp3	The only sound file was edited using WavePad Sound Editor v3.10.	The sound file opened in conjunction with the PowerPoint slideshow in CMC1 [Table D2].
Presentation files	pptx	MS PowerPoint 2007	All the PowerPoint files opened with MS PowerPoint 2007.

Table D2 is a list of the file format(s) associated with the file(s) embedded in each episode. The label 'None' indicates that there is no embedded file for that episode. There are five episodes which include a hyperlinked (embedded) file within the embedded file: tag1, RMG5, CMC1, SDP4 & tag12, and wolf 11. For example, in the episode wolf11, I embedded a text file in the episode, and within the text file is a hyperlink to a movie.

Table D2: Embedded file format for each episode in the Visual Summary

Episode ID	Episode Code	Embedded file format
090115-1	RMG1	docx
090116-1	RMG2	None
090120-1	RMG3	None
090122	RNU1	docx
090122-1	tag1	mpg1, docx
090126-1	RMG4	jpg
090127-1	WVP1	None
090127-2	RMG5	mpg2, docx
090127-3	RMG6	None
090128	RNU2	docx
090129-1	ST1	jpg

090129-2	RMG7	jpg
090202-1	ARM1	None
090202-2	ARM2	None
090203-1	SDP1	wmv
090204	RNU3	docx
090209-1	tag2	docx
090209-2	tag3	jpg
090210-1	tag4	jpg
090210-2	CMC1	mp3, pptx, docx
090210-3	WVP2	None
090210-4	tag5	jpg
090211	RNU4	docx
090216	C1	None
090216-1	WVP3	None
090216-2	tag6	jpg
090216-3	CUG1	docx
090217	C2	None
090217-1	RMG8, FTL1	jpg
090217-2	CH1	None
090218	RNU5	docx
090219	C3	None
090219-1	RMG9	None
090219-2	wolf1, tag7	jpg
090220-1	WVP4	None
090220-2	WVP5	None
090220-3	CMC2	None
090223	C4	None
090223-1	tag8, RMG10, CH2	None
090223-2	ST2	mpg2
090224-1	ST3	mpg2

090224-2	ARM3	pptx
090225	RNU6	docx
090226-1	wolf2	docx
090226-1-1	C5	docx
090226-2	tag9	None
090227-1	SDP2, CH3	None
090227-2	CH4	None
090227-3	tag10	None
090227-4	tag11	None
090302	C6	None
090302-1	RMG11, wolf3	docx
090302-2	SDP3, CH5	wmv
090302-3	wolf4	None
090303-1	ARM4	jpg
090303-2	CH6	jpg
090303-3	wolf5	jpg
090304	RNU7	docx
090305-1	SDP4, tag12	mpg2
090305-2	CH7	docx
090305-3	CUG2, tag13, wolf6	jpg
090306-1	WVP6	wmv
090306-2	wolf7	None
090306-3	wolf8, tag14, FLT2	None
090311	RNU8	docx
090312-1	WVP7	pptx
090312-2	ARM5	jpg
090312-3	ARM6	jpg
090313-1	WVP8	wmv
090316-1	ST4	mpg2
090316-2	BALA1	mpg2

090316-3	WVP9	jpg
090316-4	BALA2	docx
090317-1	BALA3	docx
090317-2	wolf9	docx
090317-3	WVP10	None
090318	RNU9	docx
090319-1	FTL3, CUG3, BALA4	docx
090319-2	WVP11	None
090323	RNU10	docx
090324-1	BALA5	jpg
090324-2	wolf10	docx
090325-1	ARM7	None
090330-1	WVP12	jpg
090330-2	WVP13	avi
090330-3	WVP14	docx
090331-1	WVP15	None
090331-2	WVP16	avi
090401	RNU11	docx
090407-1	wolf11	avi, docx
090407-2	wolf12	avi
090416-1	WVP17	None
090416-2	BALA6	docx
090416-3	tag15	None
090416-4	WVP18	None
090417-1	BALA7	docx